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Journal

OF THE

Royal Army Medical Corps

EDITED BY

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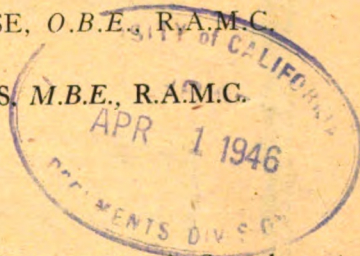
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TYPHUS FEVER IN IRAN AND IRAQ, 1942-43.

A REPORT ON 2,859 CASES.

BY

Colonel A. SACHS, M.D., M.Sc., R.A.M.C.

Late Assistant Director of Pathology, Persia-Iraq Force.

[Received November 9, 1944.]

PART I.

(A) INTRODUCTORY REMARKS.

(B) EPIDEMIOLOGICAL ASPECTS.

- (1) Topography.
- (2) Epidemiology.
- (3) Preventive Measures.
- (4) Prophylactic Inoculation.

(C) CLINICAL ASPECTS.

- (1) Signs and Symptoms of Prognostic Significance.
- (2) Variations in the Different Groups of Cases.
- (3) The Relation of Mortality to Age.

(A) INTRODUCTORY REMARKS.

THE object of this paper is to place on record epidemiological, clinical and laboratory data obtained when investigating 2,859 cases of typhus fever treated in military hospitals in Iran (Persia) and Iraq. Certain aspects of the outbreak which occurred during the Mesopotamia campaign of 1914-18 and the subsequent epidemiology of the disease in Iraq are considered. The value of large-scale prophylactic inoculation, carried out under controlled conditions, is discussed. The information given is taken from the official report submitted to the War Office by permission of the Director-General of the Army Medical Services.

The possibility of an outbreak was envisaged when cases of imported typhus fever occurred among Polish soldiers evacuated from Russia during the spring of 1942. Owing to the conditions prevalent in the early winter of 1942-43, it became evident that an increased incidence

was to be expected among the poorer classes in Iran. The Director of Medical Services, Persia-Iraq Force, adopted precautions to check the spread of the disease to the military population, and made arrangements to have cases admitted to military hospitals as completely investigated as field conditions would permit. Major J. H. Bowie, I.M.S., was placed in charge of a research team which later carried out investigations in Mosul (Northern Iraq) and Teheran.

(B) EPIDEMIOLOGICAL ASPECTS.

(1) *Topography.*

In order to follow the spread of the disease it is useful to consider the routes into Iraq from east and north. These main routes carry the bulk of the traffic from Western Asia and Southern Europe into Iran and Iraq. They do not include the more southerly routes which connect Iran with India through Kerman and Yezd.

(1) The most easterly of these routes is that from Meshed carrying the trade from Afghanistan.

This is joined by the road from Gurgan which brings traffic from the East Caspian region, and proceeds to Teheran, whence the main traffic line to the south is through barren hilly country to Qum where the road divides. One branch goes almost due south to Isfahan round Shiraz, and from there to the Persian Gulf ports. The other proceeds in a more south-westerly direction through Arak (Sultanabad), Malayer, Khurramabad, Dizful, Awaz, Khurramshah and Abadan. In addition there is now a railway which goes from Teheran *via* Awaz to Khurramshah.

(2) The second main route is from Tabriz in North-West Iran. This, at first, follows a south-easterly direction to Kasvin. From there it goes south-west till it reaches Hamadan, crossing the Aveh pass (7,500 feet). After leaving Hamadan the route crosses the Shah Pass, when it descends on the way to Kermanshah, running between hills close to the north and the comparatively fertile valleys of the south. Kermanshah is the most westerly of the big towns in this stretch of the Iranian plateau. From here the road passes through rather barren country to the Iraq border where, after a gradual descent, it comes into the desert country around Khanaqin. The desert route runs from Khanaqin to Baghdad. This is probably the main traffic route from Iran into Iraq and is supplemented by a railway.

(3) The third route is one which carries trade from the western and southern shores of Lake Urmia and surrounding country, and brings it westward to Ryat, near which town it crosses into Iraq. The route continues through hilly country until it reaches the plains near Erbil. From here trade can be diverted either to Kirkuk and the south, or to Mosul and the west.

(4) The fourth route begins in the area south of Lake Urmia and traverses the hills to Penjwin and then proceeds to Kirkuk.

The remaining two routes are concerned only with Iraq and the countries of the north and west.

(5) The fifth route starts from Zakho near the Turkish Border almost due north of Mosul and leads direct to that town.

(6) The sixth and more important of the trade routes for this direction is that which starts from Nisibin on the Syria-Turkish border and continues south-east over flat arid country to the Iraq-Syrian border at Tel-Kotchet and thence on to Mosul.

Routes from Iraq to the West.—From Mosul in the north two routes pass into Syria. The first, as already referred to above, is from Mosul to Nisibin. The second and more southerly route traverses more desert-like country to Der-Ez-Zor via Telafar.

Further to the south, from Baghdad, starts the main route from Iraq into Trans-Jordan and Palestine. This is the desert road which passes through Rutba.

(2) *Epidemiology.*

The epidemicity of typhus fever in Iran (Persia) is well known, but owing to the absence of any proper notification system of infectious diseases no reliable statistics are available.

Typhus is also endemic in Iraq, but less widespread than in Iran. It occurs frequently in the northern districts where the winter is severe and where frequent contact occurs in the course of trade between the inhabitants and those of the Iranian villages across the border. Iraq has an efficient health service and a system of notification of infectious diseases.

(a) *Typhus Fever during the Mesopotamia Campaign, 1914-18.*—The Official History of the War 1914-18, Medical Services, General History (1924), conveys the impression that typhus was not then considered a serious problem in the British and Indian Armies in Mesopotamia. It records two British and two Indian patients admitted to hospitals in the Basrah area between December, 1916, and September, 1917, and fifteen British and thirteen Indian in the 13th and 14th Divisions in Upper Mesopotamia between October 1, 1917, and December 31, 1918. In Iran the disease appears to have been more prevalent in the Army, but still not extensive. From October to December, 1918, fourteen cases of typhus were recorded among troops in North Iran. Elsewhere typhus reported on the Iranian lines of communication in October, November and December, 1918, reached its peak on December 31, when there were fifteen cases. A fuller account is given by Willcox (1920).

Conditions were otherwise in the Turkish Army where the disease was very prevalent. This is referred to in the Official History (1924), in Willcox's paper (1920), and is confirmed by doctors, now in the Iraq Health Service, who were then in the Turkish Army.

Among the civil population the incidence was not high in Basrah and Amara. The only source of danger to the British and Indian troops was infection from Turkish prisoners until the capture of Baghdad in March, 1917, when cases appeared but, after June, 1917, typhus practically died out. It broke out again in February, 1918, infection being due to contact with local labour corps mainly recruited from refugees from North Iran.

In Iran conditions were worse than in Iraq. Typhus was rampant among the population. Refugees streamed into Iraq from North Iran, and, in addition to being employed in labour corps, large numbers were sent to the refugee camp at Baqubah near Baghdad where a serious epidemic of typhus broke out.

Willcox (1920), dealing with the 1916-19 period, writes :—

"Northern Persia had been much affected by the War. In 1914 and 1915 the Turks were in occupation there and they retired before the advancing Russian troops who occupied Northern Persia in 1916 and 1917. The local population in consequence of the using up of the local food supplies by the invading armies suffered terribly from famine and many of their primitive dwellings were wantonly destroyed. They were indeed in a desperate state. The appalling conditions led to their clothing being of the filthiest and scantiest description and to an extreme degree of starvation. The famished inhabitants were crowded together in the rudest dwellings and under the most insanitary conditions; they thus became very heavily infested with lice and, in consequence of this, typhus and relapsing fever were rampant amongst them. Indeed during 1918, typhus and relapsing fever were extremely common amongst the inhabitants of Northern Persia, and several of our men who by their military duties were brought into contact with the local population contracted these diseases.

"In the latter half of 1918 some 70,000 refugees from the district round Lake Urmia and Lake Van were driven by the Turks to seek refuge in Mesopotamia and they travelled down this great distance (some 500 miles) with their families and household goods under conditions which it is difficult to describe but can perhaps be imagined. The remarks about the inhabitants of Northern Persia apply to some extent to refugees so that many of them were heavily louse infested and, as a consequence, typhus and relapsing fever occurred in considerable numbers."

(b) *Brief History of Typhus Fever in Iraq Subsequent to 1918*¹.—The following general observations have been made from information available :

¹The details given in this section were supplied by Professor C. P. Beattie, Professor of Bacteriology, Royal Faculty of Medicine, Baghdad.

(i) In the Baghdad area, and probably also south of Baghdad, typhus is endemic using the word in its true epidemiological sense with no implication as to whether it is louse-borne or murine, but both varieties are believed to be present. In those areas it is not, as a rule, a serious menace.

(ii) In the north of Iraq, and particularly in Kurdistan, typhus is always smouldering and frequently gives rise to epidemics in the spring. Here the disease is almost certainly the classical louse-borne type. These epidemics are a recurring danger to the health of the cities of Mosul, Arbil, Kirkuk and also Baghdad.

(iii) In Iran, classical louse-borne typhus is prevalent. The most serious menace to Iraq is from Iranians entering the country, either as refugees, as in the 1914-18 war, or in search of employment.

(iv) The months of maximum incidence are still as shown in Willcox's chart (1920)—March, April, May and June.

Typhus fever continued to be prevalent in Baghdad till 1924 or 1925 when it died down. This disease was of a severe type with a marked rash. As far as information is available, it would appear that the disease was most prevalent in winter, but continued into the spring and early summer.

Typhus is always present as is shown by the Civil Health Service records and supported by results of Weil-Felix reactions. Laboratory returns for the years 1939, 1940, 1941, and 1942, during which period the Weil-Felix reaction was done on all sera submitted for agglutination reactions, suggest that typhus has one-quarter the prevalence of enteric fever.

In April, 1940, an epidemic of typhus broke out in Baqubah prison and subsequent cases occurred in Baghdad prison. There is little doubt that the Iranians arrested for illicitly crossing the frontier, and sent to an overcrowded and insanitary prison at Baqubah, were responsible for this outbreak. The disease was severe, of classical type, and the percentage mortality was about twenty.

About the same time a severe type of typhus was reported in Kurdish villages near Kirkuk. In one village six out of twenty-six patients died. Again Iranian beggars were suspected of having introduced the infection, but with less certainty than in the case of the Baqubah outbreak.

In the spring of 1943 there were considerable epidemics in Northern Iraq and also in the Basrah area. Extension of the facilities to perform the Weil-Felix reaction to the laboratories in Mosul, Kirkuk and Basrah assisted diagnosis and probably resulted in more cases being notified. High prices of food, clothing, soap and fuel favoured these epidemics. Probably even more important were the movements of population, especially of the Iranians entering Iraq in search of employment.

(c) *Typhus Fever in Iran and Iraq—1942-43.*—It is reported that during the winter and spring of 1941-42 cases of typhus in Teheran were "more numerous" than usual. There are no figures to support this statement, which is the opinion of local medical men and can be regarded as reliable.

In the spring of 1942 some 28,000 Polish refugees and soldiers evacuated from Russia arrived in Iran via Pahlevi, a port on the Caspian coast. Typhus was stated to have been rare in the concentration camp from which they came, Malnutrition was marked. The strictest measures were taken to prevent the spread of disease. All refugees were disinfected on arrival at the port and again at Teheran where they were segregated from the local populace. Cases of typhus occurred shortly after disembarkation. It is improbable that any cases contracted the disease after leaving the port of arrival. In view of the strict measures adopted, and the early cessation of new cases, it is unlikely that this imported typhus had any bearing on the outbreak that occurred among the civil population of Iran during the ensuing winter.

In the winter of 1942-43 it was merely history repeating itself. Conditions in Iran were especially favourable for an epidemic of typhus. The economic state of the poorer class was deplorable. The wheat crop was inadequate for the needs of the country and the price of

bread, the staple article of food, soared to unprecedented heights. The starving population, ill-clad and verminous, wandered from town to town and across the frontier into Iraq in search of work and food. The winter in North Iran was unusually severe,

The present outbreak started in December, 1943, when cases of typhus were reported to be occurring in the civil population at Teheran and Kermanshah in Iran, and Mosul in North Iraq, and rapidly increased in intensity. In February, 1944, it was reported that there were over a thousand cases in the relatively small town of Kermanshah. Towards the end of March the epidemic had reached such proportions in Teheran that the Iranian Government appealed to the British Army for assistance, and a complete hospital was placed at its disposal.

At Abadan the Anglo-Iranian Oil Company admitted over a thousand cases to their coolie hospital.

In Iraq the disease was widespread, but assumed less serious proportions. It is worthy of note that of the 1,300 cases reported, the majority occurred at the three main points of entry from Iran, viz. Basrah, Suleimaniya and Mosul.

From a labour force of 10,000 coolies, employed by the British Army at Basrah, cases of typhus were treated in a military hospital set apart for this purpose.

It was hardly to be expected that the many thousands of British and Indian troops scattered throughout Iran and Iraq could escape unscathed, particularly when it is remembered that many of them were, in the course of their duties, constantly in close contact with local labourers.

The first military cases occurred in January, 1943, when 11 were diagnosed. The peak months were April and May when 50·7 per cent of the total cases occurred. These observations are very similar to those made by Willcox (1920).

Military cases were sporadic, being reported from all parts of the Command. In no instance could case-to-case infection be established. Only three were louse infested on admission to hospital. All gave a history of close association with the civilian population.

(d) *Incidence and Mortality Rates.*—Relevant statistical data is given in the following tables :

TABLE I.—MESOPOTAMIA CAMPAIGN 1917 AND 1918.

	<i>Admissions</i>	<i>Ratio per 1,000</i>	<i>Deaths</i>	<i>Per cent mortality</i>
British troops ..	150	0·58	34	22·7
Indian troops ..	386	0·56	89	23·0
Totals ..	536	0·56	123	22·75

TABLE II.—MILITARY CASES 1942-43.

1942 (<i>Spring</i>).				
	<i>Admissions</i>	<i>Ratio per 1,000 (for outbreak)</i>	<i>Deaths</i>	<i>Per cent mortality</i>
Polish troops ..	420	28·0 (approx.)	48	11·4
1943 <i>January 1 to July 31.</i>				
	<i>Admissions</i>	<i>Ratio per 1,000 (for 7 months)</i>	<i>Deaths</i>	<i>Per cent mortality</i>
British troops ..	42	0·64	10	23·8
Indian troops ..	118	0·84	25	21·2
Totals ..	160	0·78	35	21·9

TABLE III.—RECORDS OF IRAQ CIVIL HEALTH SERVICE 1932-43.

1932 .. 4	1935 .. 76	1938 .. 4
1933 .. 24	1936 .. 2	1939 .. 172
1934 .. 207*	1937 .. 44	1940 .. 151

*The large number of cases recorded for 1934 was due to a considerable epidemic in Kurdistan.

	<i>Admissions</i>	<i>Deaths</i>	<i>Per cent mortality</i>
1941	129	3	2·3
1942	172	2	1·2
1943 (Jan. to July) ..	1 302	128	9·8

TABLE IV.—CIVILIAN CASES TREATED IN MILITARY HOSPITAL 1943.

				<i>Per cent</i>
				<i>mortality</i>
		<i>Admissions</i>	<i>Deaths</i>	
Iranian civilians (a)	.. ..	2,036	244	12.0
Coolie labourers (b)	.. ..	243	92	37.9

(a) Not even approximate figures are available for this outbreak as no satisfactory records were maintained by Civil Health Authorities. It is possible that some 50,000 cases occurred in Iran. The 2,036 cases were admitted to the military typhus hospital at Teheran during the period April 11 to July 10, 1943.

(b) This group consists of some 10,000 Iranian and Iraqi Coolies employed by the Military Command in various Supply Depots. Iranians were chiefly old men and young boys who were physically poor under-nourished specimens. All were probably infested with body lice. The cases were admitted to a 100-bedded section of a military hospital at the Base during the period April 20 to July 13, 1943. Ratio per 1,000 is approximately 27.0.

COMMENTS.

Case mortality is relatively high and varies very little between British Troops, Indian Troops and Coolies in South Iraq, but it is considerably lower among civilians in Northern Iran. It is also evident that the percentage mortality for troops in the two campaigns is very similar.

The lower mortality among Polish troops and Iranian civilians may be due to some degree of acquired immunity, as typhus fever has been endemic in Poland and Northern Iran.

The difference in mortality between the Iranian and Iraqi civilians, and the Coolies—the majority of whom were Iranians—is more difficult to explain.

One important reason for this difference may be the movement of individuals from localities, where they had acquired some degree of immunity to a particular strain, to another, where a different strain was prevalent.

Both groups were almost equally exposed to the other factors associated with outbreaks of typhus, i.e. under-nourishment, lousiness, infrequent washing, overcrowding, etc.

Another point for consideration is how far those figures were really comparable. All cases and deaths among military personnel and South Iraq Coolies were recorded, but in Northern Iran figures relate only to individuals who happened to be treated in a military hospital. No information is available as to the number of cases and deaths which occurred apart from these recorded cases. It is therefore uncertain which way this may influence case mortality, but the figures do afford a basis for comparison.

(3) *Preventive Measures.*

As soon as it became apparent that an epidemic of typhus was probable, all possible steps were taken to protect military personnel from infection.

To facilitate control Administrative Districts in Iraq and Iran were subdivided into a number of small areas. On the occurrence of cases of typhus a notification was issued by G.H.Q., Paiforce, proclaiming the particular area a "typhus area." Movement within and without was restricted. Villages and Bazaars were placed out of bounds for troops. This occasionally led to difficulties for a time in obtaining supplies of fresh milk, vegetables and fruit for the troops in some areas, but these difficulties were more apparent than real. Troops arriving from these areas were segregated until they were found to be free from infestation.

The prevention and control of louse infestation was made a unit commander's responsibility. Weekly inspection of all troops was ordered and arrangements were made for disinfection of those found to be verminous. Louse infestation was found to be more prevalent among personnel in transport units who, by the nature of their duties, did not always have the same opportunities as others for obtaining facilities for bathing and washing their clothing. Arrangements were overhauled and improved where necessary. Mobile bath and laundry units were located in "danger areas," where the numbers of troops warranted these special units.

Special " typhus teams " were organized and trained for field disinfection of personnel and their effects. These teams were provided with protective clothing, and were equipped with portable shower-bath apparatus and disinfestors. Training was undertaken by field hygiene sections and was under the control of the Deputy Assistant Directors of Hygiene. Static disinfection stations were constructed at all the larger military centres.

Protective inoculation of all personnel of medical units, e.g. hospitals and field hygiene sections, and of all troops most closely associated with native labour, was carried out (*vide* Section (4)).

A major problem was presented by the large number of labourers employed by civilian contractors on behalf of the military authorities and not under direct military control. At Basrah this problem was solved, in part, by establishing a coolie camp for those whose homes were not in the vicinity of their work. A medical officer was appointed to the camp and all coolies were inspected and disinfested weekly. In the case, however, of the large number of labourers who returned to their homes nightly, such measures were valueless; the men became reinfested in their homes. For these the Army Anti-Louse Powder (A.L.63) was supplied, and its use enforced with satisfactory results. A supply of lethane-impregnated belts arrived too late in the season to be of value.

It seems not unreasonable to claim that the low incidence of typhus among military personnel, living under unfavourable conditions, is proof of the efficacy of the measures adopted for their protection.

(4) *Prophylactic Inoculation.*

Early in January, 1943, 400,000 c.c. of Cox's type typhus vaccine were received. This vaccine is prepared from cultures of rickettsia in the yolk sac of developing chick embryos. The type used was the epidemic strain of rickettsia. Three injections of 1 c.c. were given subcutaneously at weekly intervals. From information available and from our own experience it would appear that immunity takes six weeks to develop after the third injection. During the occurrence of cases of typhus immunity was regarded as only lasting for three months. A boost dose of 1 c.c. was therefore given at three monthly intervals as long as cases of typhus were occurring.

As there was an increased incidence of typhus among the civilian population, and as cases occurred in the Army, the D.M.S., Paiforce, issued instructions on January 15 that certain categories of personnel were to be protected, viz. :

- (i) Staff of hospitals nursing cases.
- (ii) Personnel of field hygiene sections, mobile bath and laundry units.
- (iii) Engineer, supply and transport, and ordnance personnel in contact with civilian employees.

It must be emphasized that although prophylactic inoculation was instituted, orders were issued to ensure that the prevention of infestation was to be regarded as of paramount importance.

During the period under review, approximately a quarter of the Force was protected. In considering the incidence of typhus fever, anyone who had received one or more doses of vaccine is included in the group of protected personnel.

(a) *Incidence of Typhus Fever.*

<i>Protected Personnel.</i>			
No. protected (approx.)	51,000		
No. of cases	.. 19	Ratio per 1,000 for 7 months	.. 0.37.
No. of deaths	.. 2		

<i>Unprotected Personnel.</i>			
No. unprotected (approx.)	155,000		
No. of cases	.. .. 141	Ratio per 1,000 for 7 months	.. 0.91.
No. of deaths	.. .. 33		

It is impossible to be dogmatic about the value of any prophylactic inoculation during the course of an epidemic. These figures, however, show that there was a lower incidence of typhus in the inoculated group than in the uninoculated. It must be emphasized that the former group were far more exposed to infestation than the latter and, with the exception of certain medical and hygiene personnel who were issued with special protective clothing, had only the additional protection of prophylactic inoculation.

The best *presumptive* evidence available to assess the value of the vaccine is from West Central Iran which includes Kermanshah and Sultanabad. It was in these areas that typhus fever first occurred among military personnel in January and February. Prophylactic inoculation was therefore instituted early and the majority of those requiring protection were fully immunized by the middle of March, i.e. six weeks after receiving their third dose of vaccine. Here, as elsewhere in Iran and Iraq, typhus fever was on the increase among the civil population, reaching a maximum intensity in April and May.

The table below gives a comparison between the incidence of typhus fever in the troops in West Central Iran and those in the adjacent area of Southern Iran where prophylactic inoculation was instituted too late for protection to be obtained before the peak of the outbreak was passed. The number of troops located in each area was approximately the same. In addition to typhus occurring in the surrounding towns and villages, personnel stationed in West Central Iran were exposed to an additional risk from the stream of road traffic along the Sultanabad, Kermanshah, Khanaqin route to and from Iran and Iraq.

WEST CENTRAL IRAN.				SOUTHERN IRAN.			
		Cases	Deaths			Cases	Deaths
January ..	..	4	3			2	—
February ..	..	3	—			3	1
March ..	..	4	1			14	1
April ..	..	1	—			19	6
May ..	..	—	—			10	2
June ..	..	1	1			2	—
July ..	..	1	—			1	—
		Totals	14	5		51	10

The above figures show that there was a lower incidence of typhus fever in March, April and May among the troops in West Central Iran than in Southern Iran.

During the seven months under review, 15 cases occurred among personnel of the R.A.M.C. and I.A.M.C., with two deaths. Only four cases had received prophylactic inoculation prior to infection. In the Teheran typhus hospital, out of a staff of five hundred inoculated personnel employed in handling and treating cases, two mild cases occurred.

(b) *Relationship between Dates of Onset and Inoculation.*—Approximately one-third of the cases developed typhus between the first and third doses of vaccine and the remaining two-thirds within six weeks after the third inoculation. *It is of interest to note that no case of typhus occurred in individuals who were fully immunized, i.e. six weeks after the third dose.*

(c) *Type of Disease in Protected Personnel.*—In 16 of the cases the type of disease has been recorded :—

Mild, 9 Moderately severe, 3 Severe, 2 Fatal, 2.

The type of disease in cases who had received any prophylactic inoculation was generally described as less severe than in the non-inoculated.

(C) CLINICAL ASPECTS.

No striking new facts were brought to light. The clinical features of the epidemic in Iran and Iraq in 1943 and the outbreak among the Polish Forces during their evacuation from Russia to Iran in 1942 conform in the main with the published description of the disease.

Therapeutic treatment has in reality made little progress, if any, since the previous Mesopotamia campaign. Willcox (1920) stressed the value of subcutaneous and intravenous saline in severe cases. He also refers to the liability to sudden collapse and advocates the continuance of stimulants for some days after the temperature has become normal.

Sulphapyridine was given early in a total of 336 cases, of whom the majority had signs of pulmonary involvement. The following observations were made :—

(a) Sulphapyridine is shown to be of no benefit in treatment of typhus as such, but it may possibly have some effect where there is a complicating pneumonia.

(b) The use of the drug is justified in cases with pulmonary involvement, although no striking results are to be expected.

(c) Administration of sulphapyridine on or before the fifth day did not reduce the incidence of bronchopneumonia or have any significant effect on mortality.

Atebrin was used without any beneficial or detrimental effect in six cases.

A general description of typical cases of typhus fever is unnecessary in a paper of this type. The relative frequency of various features analysed stresses the prognostic importance of certain signs and symptoms, some of which although generally considered to be of prognostic importance have not been shown to be so in this statistical series, and are discussed below. Facts were obtained from a special case sheet which was completed in all typhus fever cases. In assessing the reliability of information, considerable reserve is necessary in accepting figures for less clear-cut features and histories. Under epidemic conditions standards of diagnosis vary and the clinical picture is often confused by associated disease, e.g. malaria and syphilis among coolies. Subjective symptoms are difficult to evaluate owing to language difficulties and the variable mental capacity of patients.

(1) Signs and Symptoms of Prognostic Significance.

Clinical features which were relatively uncommon in the non-fatal cases and significantly more common in the fatal cases are valuable prognostic guides.

(a) Presence of any of the undermentioned features indicates a bad prognosis. The relative frequency of their occurrence in fatal and non-fatal cases is given.

	Non-fatal Per cent	Fatal Per cent
(i) Coma vigil.	1	34
(ii) Black or brown dry fur on tongue	3.8	31
(iii) Jaundice	1	9
(iv) Urinary incontinence or retention	3	16
(v) Diarrhoea	6	28
(vi) Typhoid state	13	43
(vii) Delirium	21	52

(The percentages given were obtained from an analysis of 226 unselected cases among British and Indian troops and coolies; of these 68 terminated fatally.)

The features shown to be of serious prognostic significance are in general those of severe toxæmia. The serious prognostic significance of jaundice was not previously realized and was present in two children who died in Teheran.

(b) *Rash*.—Some type of rash was present in almost all patients, and was equally common in fatal and non-fatal cases. The rash commenced with a macular eruption. The first macules were sparse and constantly appeared on the anterior axillary folds. Subcuticular mottling was rare and when present usually associated with peripheral circulatory failure. The face, palms or soles were *not* involved in a single Iranian case treated in Teheran. The rash cannot be detected on very dark-skinned people. A hæmorrhagic rash with superficial

purpura was frequently present in severe toxic cases. In one fulminating fatal case both a hæmorrhagic rash and multiple hæmorrhages were noted. The presence of a petechial rash (present in 59 per cent of non-fatal and 68 per cent of fatal cases) with or without purpura (present in 3 per cent of non-fatal and 3 per cent of fatal cases) was not found to be of any prognostic value as this was equally common among fatal and non-fatal cases. These findings are at variance with the usual views.

(c) *Respiratory Involvement*.—Some degree of respiratory involvement was always present except in the mildest cases, but there is some divergence of findings as to the nature of the lesion present. Bronchial catarrh, acute bronchitis, acute bronchitis with hypostatic congestion, hypostatic pneumonia, bronchopneumonia and massive lobar pneumonia have been recorded in roughly equal proportions. Variation appears to occur in different localities, but this may be possibly due to the personal idiosyncrasy of different medical officers.

Extensive consolidation occurred more frequently in non-fatal (13 per cent) than in fatal cases (3 per cent). An explanation may be that fatal cases die before they have had time to develop consolidation. It would therefore appear that if a patient survives long enough to develop consolidation, his chances of survival are better. No information is available as to the date on which consolidation was detected.

(2) *Variations in the Different Groups of Cases.*

Although the disease in the different groups was basically the same, there were some significant differences.

(a) The most striking of all features is that 55 per cent of the North Iran cases died of circulatory failure or pulmonary œdema whereas no case in South Iraq was noted as having either of these symptoms. The incidence of hypostatic congestion was also much higher in North Iran (21 per cent) than in Iraq (2 per cent). This strain in North Iran would therefore appear to have some special affinity for the peripheral circulatory system.

(b) Cyanosis of fingers and toes was more common in South Iran than in other localities in Iran and Iraq. Thrombophlebitis, cancrum oris, gangrene of the buttock and ears have also been recorded in cases from this area.

(c) In South Iraq there was a very much higher incidence of mental symptoms suggesting a neurotropic type. Bronchopneumonia was also more frequently found in the South Iraq cases.

(d) Enlargement of spleen.—South Iraq: A high rate among coolies (64·2 per cent) is not surprising because many of them come from malarious areas where the spleen-rate in children approaches 80 per cent. The rate (about 45 per cent) for troops and that (about 60 per cent) for civilians in Teheran, where malaria incidence is low and later in the season than typhus, are more reliable. They show that splenic enlargement is more common than most textbook descriptions indicate.

(e) *Mental Symptoms*:—

	<i>Coma vigil</i>		<i>Typhoid state</i>		<i>Stupor</i>		<i>Delirium</i>	
	<i>Non-fatal</i>	<i>Fatal</i>	<i>Non-fatal</i>	<i>Fatal</i>	<i>Non-fatal</i>	<i>Fatal</i>	<i>Non-fatal</i>	<i>Fatal</i>
British troops	0	58	26	72	57	86	48	86
Indian troops	0	31	47	63	56	81	37	88
Iranian civilians	0	9	0	32	0	34	0	28
Coolies	1	32	0	32	77	91	10	33

(Figures above represent percentages.)

Although there is little difference in the occurrence of coma vigil and stupor among troops and coolies, delirium and typhoid state were less common in the latter. Mental symptoms were markedly less frequent among Iranian civilians. A possible explanation for this variation is that the Iranian civilians and coolies had acquired some degree of immunity in the past and consequently were less liable to toxic manifestations.

(3) *The Relation of Mortality to Age.*(1) *British Troops, Indian Troops and Coolies (an analysis of 226 unselected cases).*

<i>Mortality in Age-groups.</i>		<i>Per cent</i>
Under 19	..	16·7
20—29	..	20·0
30—39	..	27·1
40—49	..	63·2
Over 50	..	58·3

(2) *Iranian Civilians.*—Among the cases treated in Teheran there were 100 cases under 12 years old, with only two deaths.

It was the consensus of opinion that after the age of 50 the prognosis of a case of average severity is always in doubt and after 70 invariably fatal.

It is important to remember the high mortality rate over the age of 40 when selecting personnel for employment in the control, treatment and investigation of typhus fever.

(*To be continued.*)

A SURVEY OF THE ACTIVITIES OF THE MILITARY ISOLATION HOSPITAL, ALDERSHOT, 1939-1945.

BY

Lieutenant-Colonel R. W. CUSHING, T.D.,
Royal Army Medical Corps,
Officer Commanding, 1939-1945.

[Received November 27, 1945.]

THIS hospital is situated in the highest part of Aldershot.

It stands on a plateau measuring 7 acres, and is 362 feet above sea-level. A visit from any angle requires a climb ; but one's labour is more than rewarded by the wonderful view of far distant country in all directions. It has well been called "The Aldershot Riviera," and very closely resembles the outlook from many a hill station in India. The official "Guide" states that the weather in Aldershot is remarkably good, but the temperature recorded is extremely low in winter, this being due to the sandy nature of the sub-soil. It was well chosen for its purpose, and I attribute our very low death-rate to the salubrious atmosphere enjoyed by all patients, in addition to the fact that the patients generally consisted of healthy young soldiers.

At the outbreak of war the bed establishment was 58, but it soon had to be increased to 100, and later to 177, extending in emergency to 253. This, of necessity, has been very elastic for at one time in 1940 we had as many as 365 bedded patients, some of the beds being improvised.

The hospital is comprised of three main sections or divisions :

(1) The Men's Division of 38 beds ; (2) "The Colony" consisting of two brick wards, and four wooden huts with 112 beds, for male "other ranks" ; and (3) The Women's Division of 47 beds, of which there is a modern brick cubicle block for women and children, and one ward of 12 beds is earmarked for A.T.S. The other wards in this division are very fluid and have often been in use for male patients.

The O.C.'s house, at the lower end of a delightful copse of birch trees, was misappropriated and furnished as an overflow ward for officers, and at one time was itself full and overflowing.

The Men's Division comprises a ward of four cubicles for officers.

"The Colony" has been reserved for the minor infectious diseases, and convalescent scarlet fever or diphtheria cases transferred from the Men's Division.

With the increase of beds followed the necessary addition to the nursing staff and their accommodation. We solved this problem by taking over some married quarters adjoining the hospital, and there they have extremely comfortable sleeping accommodation—not only for the R.A.M.C., but also for the 17 A.T.S. who were posted to us, releasing 14 R.A.M.C. for field service. Later 5 V.A.D. auxiliaries were posted to us and we converted the hospital steward's quarters into a comfortable Mess for them.

The staff of the hospital consists of the O.C., a Detachment R.A.M.C. Officer, a Matron and 12 Q.A.I.M.N.S. Nursing Officers, a Quartermaster, and a Detachment of R.A.M.C. with V.A.D. and A.T.S. totalling 66.

During the war there have been 26 medical officers as colleagues for varying lengths of time, and of these three have been ladies. I have had no less than 16 matrons, 7 quartermasters and 23 serjeant-majors. "C'est la guerre !" It can easily be judged that so many changes in such key positions have not helped from the point of view of administration, but the keenness in assistance and co-operation practised by all has more than counterbalanced this. Here may I pay generous and genuine tribute to one and all of my large family of matrons. Matrons, I salute you !

The matrons and sisters have a very comfortable and well-appointed Mess adjoining the administrative block.

Now, as regards the work done. The grand total of patients admitted during this war is 9,210, of which 8,903 were a "true-bill," that is, they were suffering from an infectious disease. The other 307 cases were suffering from another disease not generally admitted to this hospital, and were accordingly transferred to the correct hospital. I submit a list of the final diagnoses made in these cases. They were :

Glandular fever	Bronchitis	Scurvy
Influenza	Seborrhœic dermatitis	Quinsy
Diphtheroid infection	Pityriasis rosea	Peritonsillar abscess
Streptococcal tonsillitis	Catarrhal sinusitis	Rhinitis
Vincent's angina	Enteritis	Stomatitis
Urticaria	Pleurisy and pneumonia	Eczema
Cervical adenitis	Bronchopneumonia	Otitis media
Belladonna poisoning	Pulmonary tuberculosis	Submandibular abscess
Empyema	Influenzal tracheitis	M & B rash
Rheumatic purpura	Toxic erythema	Tinea
Alveolar abscess	Acne	Post-inoculation debility
Purulent parotitis	Pneumococcal carrier	Lumbar fibrositis
Cyst of Stenson's duct	Shingles	Acute rheumatism

The dermatologists on the staff of the old Connaught Hospital—that is before it was taken over by the Canadians as a General Hospital—were of unfailing help with their expert knowledge in diagnosing cases which we could say nothing more than that they were not infectious. The very common diagnosis was seborrhœic dermatitis or pityriasis rosea. Most of these were sent in as scarlet fever, measles or rubella.

As a general routine, throat swabs were taken of all cases on admission, and three clearance swabs before discharge. This was eventually given up, with the exception of diphtheria cases, as not being of any practical value to the medical officer, the patient or the outside public.

The following table shows the annual incidence of each disease:

Disease	1939	1940	1941	1942	1943	1944	1945	Total
Rubella	40	2,745	528	229	222	242	190	4,196
Measles	26	105	179	131	291	163	221	1,116
Mumps	8	59	338	285	147	94	163	1,094
Chicken-pox	2	29	59	69	67	89	31	346
Scarlet fever	4	116	127	131	181	159	139	857
Diphtheria	1	21	41	65	187	86	24	425
Diphtheria carriers	—	—	1	—	47	27	—	75
C.S.F.	4	121	59	27	26	16	10	263
Meningococcal septicæmia	—	3	2	2	—	3	2	12
Meningococcal carrier	—	—	1	1	—	—	—	2
Whooping-cough	—	1	8	3	8	3	6	29
Erysipelas	—	6	14	16	26	16	7	85
Annual total	85	3,206	1,357	959	1,202	898	793	8,500

NOTE.—For a time, until cases of scabies were treated in unit lines, we admitted and treated 403 such cases amongst members of the A.T.S., thus bringing the grand total up to 8,903.

Rubella.—As the figures above show, in 1940 and the first half of 1941 we had an outbreak of rubella amongst the troops, mostly of the 51st Highland Division, who had come straight from the heather, and had built up no immunity to a hitherto unknown virus. The 1st Canadian Division also suffered very heavily. It was a problem how to deal with such numbers. Efforts were made to arrange for unit isolation, but it can be seen how impossible that was in view of each division making up for immediate embarkation overseas. We finally misappropriated a whole block of married quarters in the cavalry barracks. This gave us a possibility of 175 beds. We fitted up an auxiliary hospital, complete with orderly-room, kitchen, and entirely self-contained, with a male staff of 1 visiting medical officer, 2 N.C.O.s, 3 cooks, 1 sanitary assistant, 3 nursing orderlies and 11 general duty orderlies.

The type of infection was mild during this outbreak. The difficulty was the numbers that incessantly flowed in ; and at that stage of the war, convalescent auxiliary hospitals and convalescent depots were either unborn or in their infancy. We commenced by keeping the cases in hospital the full eight days, this being soon reduced to six, and eventually to four, when the temperature fell and the rash faded. They were then discharged and sent to their homes on four days' sick leave.

Later on a more virulent type of rubella appeared, with a high temperature and more general disturbance, with even pneumonitis and meningeal signs and a much heavier and coarser rash—hardly distinguishable from measles. As a matter of fact, I am sure that some cases were admitted into the measles ward, and possibly vice versa, and with it all we unfortunately failed to observe any cross infection. There were cases that developed a "secondary rash," and one even a "tertiary rash." May he be forgiven ! As the troops disappeared, so did rubella.

Measles.—This has remained fairly constant throughout the whole war. There was one point that impressed us, and that was that measles is definitely a severe infection. A man who has rubella may not know it. That cannot be said of measles. A look at the patient shows you that he is ill, and he knows it, too. Koplik spots were far from constant, or probably not often seen, because by the time that the patient arrived at the hospital the rash was out fully developed. There was usually a high temperature, which remained until the rash faded, perhaps not for six or more days. Serum was never used, as it is of no value after the onset of the fever. The virus is highly noxious, and pneumonitis was a very common part of the illness. Some were so toxic that they had encephalitis with convulsions. One case had a marked spasticity of upper and lower limbs, and became quite irrational and mental, with speech affected as in a tubercular meningitis. This case was lumbar punctured and given soluseptasine intravenously and eventually recovered. The severe cases with pneumonitis reacted very well to sulphanilamide.

Mumps.—1941 and 1942 were our peak years. As a general rule it was the straightforward type of epidemic infective parotitis, often starting on one side and within forty-eight hours becoming bilateral. The females seem to take the infection more severely than the males, and with them the amount of swelling was much more marked. A number of cases did not support the primary diagnosis, and some were dental in origin; one had a cyst in Stenson's duct ; one proved to be a purulent parotitis, and one remained undiagnosed beyond the assured statement that she was not a case of mumps. This last case did not follow the course of mumps, and I believe was eventually diagnosed as hysteria, and sent to a neurological hospital. Ten cases were found to be a mixed infection, with bull-neck diphtheria, and were treated as such. There were two cases of "reversed mumps," i.e. the complication (orchitis) appeared before the parotitis.

The pouting of the orifice of Stenson's duct is a very common sign. In four cases, abscess formation developed and operative treatment ensued. Some had signs of encephalitis with a very high temperature. This can be a very serious illness.

Chicken-pox.—Very little variation in annual incidence. Nothing unusual or atypical in the cases seen here, excepting that there were many cases with much discomfort to the patient with the presence of the vesicles in the mouth, on the soft palate and fauces and gums. One can appreciate the real malaise and constitutional disturbance often seen, and lasting for several days, when one realizes the big area of toxin absorption, especially when there is a superadded staphylococcal infection. One case developed a staphylococcal septicæmia with multiple abscesses, which had to be opened and drained.

There is one tale to be told. There was admitted in the early days a severe case of "septic chicken-pox." He gradually became worse and the skin picture more mixed and disconcerting to the onlooker. He had urticaria with raised weals, vesicles and papules with a shotty feeling and a superadded very septic impetigo. After four days in hospital he was unfortunately diagnosed as smallpox. I never knew a 'phone could ring so incessantly.

santly! Two specialists were called in, but just at this time a wire arrived as from the clouds from the patient's own doctor, and quite inadvertently. It merely said "not small-pox, but erythema multiforme." The lad had had a similar attack before the war, and had likewise been diagnosed as smallpox, until a West End specialist had given the correct diagnosis. We never mention the word smallpox now!

The treatment of chicken-pox was nothing more than symptomatic.

Scarlet Fever.—Again no variation in annual incidence, and no deaths. Total 857 cases.

We know that of recent years the virulence and mortality of this streptococcal infection has been on the decline, and when we review the cases seen twenty years ago, with their grave and sometimes fatal complications, such as bronchopneumonia, empyema, nephritis, arthritis, endocarditis and pericarditis, meningitis, mastoiditis, and others, and form a comparison with the cases seen in this hospital, one fully corroborates this view. However, it is the exception that proves the rule, and I have seen in this hospital what I had never seen anywhere before: two cases of hæmorrhagic scarlet fever. They were bleeding at every point, and both recovered after repeated injections of hæmoplastin. Sulphonamides did not touch the case at all. Also, we had many cases of the septic or toxic type, in which the toxæmia was marked and accompanied by definite signs of cerebral irritation. I use the word "irritation" because the patient became very resistive and had to be kept down with morphia. He suffered with intense headache, with a livid colour, and nuchal rigidity. In fact one actually doubted the diagnosis, and made preparations for a lumbar puncture. There was certainly some meningitis present. Here, sulphanilamide in big doses effected the cure. We also have used the concentrated antistreptococcal (hæmolytic) serum very freely; in fact, in all cases with a temperature of 100 or over, and those with a well-marked rash. The cases in which one expects and meets complications are those with signs of old enlarged tonsils and adenoids. In view of the excellent work that has been done by the State for the children with T. & A. clinics throughout the country, it is surprising still to meet so many adult patients suffering with scarlet fever, and with the other conditions present, that is, with deep-rooted tonsils and signs of old granular meningitis. There were periodic admissions of surgical scarlet fever, following a varied assortment of operations, such as hernia, appendicectomy, compound fracture of the leg, tonsillectomy, and several following burns of the second degree. We admitted and treated as scarlet fever, and correctly so, some cases of streptococcal tonsillitis which displayed no sign of any rash. All such cases should be isolated.

Diphtheria.—There was a definite increase in the number of cases admitted during 1943: but the same applied to other diseases during that year, and the reason was nothing more than an increase in military personnel preparatory to "D-Day." They were mostly faucial in type, there being only two cases requiring tracheotomy. These were, of course, soldiers' children, and both did well. More and still more has one seen the extreme importance of early diagnosis and treatment. The only cases we lost were those which had, for one reason or another, been "sat on." One exception to this last statement, a fatal case, had an additional lesion, in the form of chronic nephritis. The two lesions were too much for him, and us.

Relapses were rare, although they did occur in a few cases that had had between 150,000 and 200,000 units of anti-diphtheritic serum. These were called "relapses" when new growing membrane appeared, and they had to be treated as new cases as far as the administration of antitoxin was concerned. With others, if the relapse was spotted and treated at the onset, it was found that a twice daily injection of antitoxin, 40,000 units in the morning followed by 24,000 units in the afternoon, very soon brought about a complete and final cure. The teaching is that 100,000 units is an adequate total dosage, and that the membrane will ultimately completely separate, but actual practice disproved this, for in some cases that had had as many as 200,000 units of serum and more, either new membrane appeared, or a small speck of membrane kept under daily observation for final disappearance.

actually started regrowth. These cases of relapse did not show any marked signs of renewed toxæmia. In severe and developed cases, the initial doses of serum were given intravenously and massive doses of vitamin C were given as part of the treatment.

Very few cases developed complications, and the mortality figure is very low—1·4 per cent. This chiefly owing to the improvement in the manufacture of the anti-diphtheritic serum, enabling one to administer really tremendous doses without the fear of any foreign protein reaction. The cases of cardiac collapse, either primary or delayed, were very few. One patient who had been a prisoner of war for four and a half years, and was very emaciated, had been treated for some days after his release for tonsillitis before being evacuated home by air. He was then diagnosed as diphtheria. After having over 200,000 units of serum he coughed up a huge cast of membrane, 6½ in. long (bifurcated at the lower end) and over 2 in. wide. He developed pneumonia in both lungs, and was treated with penicillin, with intensive doses, but eventually died of pneumonia as shown post-mortem. Another very interesting case was a Guardsman who had extensive faucial diphtheria. Although he had large doses of serum, towards the end of the third week he developed signs of a partial Stokes-Adams syndrome with varying sites of præcordial pain. His pulse-rate went down to 36 or 40 for several days, and his respiration rate to 10 and 12 per minute. He was put on intravenous glucose and ephedrine, and later became definitely psycho-pathological with areas of skin anæsthesia around the lips and nose. He was transferred to the Cambridge Hospital for galvanic treatment and massage, and ultimately made a complete recovery. The few cases of posterior palatal and laryngeal paralysis all recovered with strict enforcement of a recumbent posture. There was one case of peripheral neuritis with a speedy recovery. There were a few cases which developed a definite brachycardia, with pulse-rate of 50 and below. At first they were kept in bed; but as they showed no signs of cardiac distress or disability, on the advice of Brigadier Evan-Bedford they were allowed up, and very soon their normal cardiac rate re-established itself. One child died of respiratory and diaphragmatic paralysis. There were no cases of muscular paralysis affecting the limbs. All the staff are Schick tested before being detailed for duty in any diphtheria ward, and, if positive, they are immunized, each receiving three weekly interval doses of 1·0 c.c. of T.A.F. (toxoid antitoxin floccules) and are re-Schicked after three months, but frequently the demands of the war prevent the completion of this immunization.

For over a full year in 1943 and 1944, a military hospital, through a hidden carrier, had a small but persistent outbreak of diphtheria, and diphtheria carriers. During this time 83 cases were admitted to this isolation hospital and, of these, 25 proved to be true cases of diphtheria, 48 were carriers, and 10 were neither but suffering from some other disease.

The suspected cause of this outbreak was a member of the staff who, while serving in another Command had been treated for tonsillitis, though she later developed a peripheral neuritis and ocular paralysis, and was eventually posted to the hospital where the outbreak occurred. She was found to be a carrier and sent to this hospital. Her throat was cleared up, and she was, I believe, later discharged from the Service on compassionate grounds.

There were 54 cases of the hypertoxic bull-neck type, a mixed infection. They are very easily missed for early diagnosis, for frequently no membrane can be seen, and clinically they look like a peritonsillar abscess or true case of mumps, and maybe there is nothing beyond their fetid breath to suggest any K.L.B. infection. In addition, the laboratory report on the throat swabs almost always comes back negative for K.L.B. These are the cases that die, despite enormous doses of antitoxin, unless diagnosed early. I think no truer words were ever written than those given us by Dr. G. E. Breen in his excellent book "Essentials of Fevers," in which he says: "If swabs were abolished, the mortality from diphtheria would probably be halved" [1].

We have admitted 186 cases of diphtheria since I contributed an article on Bull-neck Diphtheria, published in this Journal in October, 1943, making a total of 425. Six cases died, giving a mortality rate of 1·4 per cent.

Meningococcal Septicæmia and Cerebrospinal Fever.—There was a small epidemic in Aldershot among the troops in the winter of 1939 and spring of 1940, as will be seen by referring to the table above. This shows four cases in 1939, 121 in 1940, and 59 in 1941. The age incidence showed it to be a disease of youth, and it was very clearly proved that the predisposing causes at this time were lack of ventilation through black-out regulations, and crowding together in barrack-rooms at night. Numbers of cases were between 18 and 20 years of age, and many with only two to ten weeks' service in the Army.

The sudden severe headache was the predominating and most constant symptom, and one that was greatly relieved by a lumbar puncture and the removal of from 30 to 50 c.c. of cerebrospinal fluid, which was always turbid and under considerable pressure.

As a matter of fact, lumbar puncture was only done primarily for diagnosis, and repeated for the relief of symptoms.

I am inclined to agree with those who affirm that the case itself is not infectious. It has surprised me that Sisters or nursing orderlies whom I have time after time seen struggling with a delirious, almost maniacal, patient, have not contracted the disease themselves. I pay tribute to their grand courage and heroic performance of their duty. We had 12 cases of meningococcal septicæmia which is terrifying in its acuteness and severity. Three of these died within a few hours of admission and just did not react to any treatment, including penicillin.

We had a total admission of 263 cases of septicæmia (12) and meningitis (251) with 9 deaths, giving a mortality rate of 3·4 per cent [3]. The physical signs of the meningitis were very constant: head retraction, varying from a minor degree to marked opisthotonus; nuchal rigidity always; Kernig's sign frequently positive, but this is not surely diagnostic; Brudzinski's sign occasionally positive; a facies of extreme anxiety and of one in great pain; the moderate case lay with knees flexed. Sometimes they were in coma; others were restless, and resistive, with signs of cerebral disturbance. Vomiting was common, and difficult to control, continuing for three or four days. The pulse was much more valuable in diagnosis and prognosis than the temperature. Herpes on the lips and other parts of the body was frequently an early sign. The blood picture was one of a leucocytosis with many polymorphs, and the meningococcus was frequently isolated from the blood, even before the meninges had become affected, proving that this infection is really a septicæmia at some stage in its course.

The cerebrospinal fluid was turbid and full of pus cells, with intracellular meningococci. Glucose was reduced or absent. Chlorides were reduced and protein increased. Petechiæ of all sizes, extending to large areas of purpura, were present, the latter especially in the acute fulminating septicæmias. We saw none of the mild or ambulatory type described elsewhere.

As regards complications, 95 per cent of the cases escaped—that is up till about a month after their discharge from hospital, which was the last time we saw any of them. I have their home addresses and intend following the cases up in about a year's time.

On one occasion I received a list of cases which had appeared before the Standing Medical Board and had been discharged from the Service, but none on that list had passed through this hospital. We saw few of the organic nervous sequelæ met by others, but these may, and do, develop later. We had one case which developed a panophthalmitis. Another, a complete nerve deafness; another a gangrene of the right lower arm, requiring amputation. A complaint of vague pain in the back was common, but I think the memory of the lumbar puncture had a lot to do with that, for time healed that unpleasant experience.

There were several cases of definite relapse or reinfection after the temperature had been normal for some days. These cases at first created a problem—to differentiate from serum reaction or some complication such as a hypostatic pneumonia. A lumbar puncture and the presence of the other physical signs and symptoms of a meningitis finally settled the question. As regards treatment, we tried all forms and varieties of the sulphonamide group, and after six years' experience since the introduction of soluseptasine, I strongly

adhere to my former statement, that soluseptasine is the best in curative effect and in the complete freedom from any adverse reactions or results [4]. There is always the fear of something happening locally after injection of one or other of the many varieties of the sulphonamides introduced.

Our routine treatment for all cases is intravenous injection of 20 c.c. of 5 per cent or 5 c.c. of 20 per cent soluseptasine diluted, four-hourly during the day, and similar intramuscular injections during the night, while the medical officer enjoys his well-deserved rest! This is carried out for two or three days and followed by four-hourly doses of 2 grammes sulphathiazole by the mouth. There is no cause for anxiety if the temperature remains high for four to six days. After this time it is bound to fall, and remain down for good, or with a slight evening rise lasting perhaps for another week. The evening will come when it will rise no more!

At the beginning of the war we collected in the cerebrospinal fever wards a disturbing variety of cases, including influenza, chronic bronchitis, emphysema, pneumonia, acute rheumatism, and other diseases listed below, which were admitted without lumbar puncture. This impossible position was relieved by it being arranged for all doubtful cases to be sent to the Cambridge or Connaught Hospital for lumbar puncture and correct hospitalization. This, however, did not appear altogether satisfactory, and it was decided that all cases diagnosed and suspect, should be sent direct here, and a ward was reserved entirely for lumbar puncture and disposal of each case. Our records show that 85 per cent of the cases thus received proved to be suffering from one of the following list of other diseases. They were: Influenza, 25; gastric influenza, 41; bronchitis, 2; pneumonia or bronchopneumonia, 8; pharyngitis, 3; tonsillitis, 2; lumbar fibrositis, 4; hysteria, 2; acute rheumatism, 2; meningitis, not meningococcal, 3; post-vaccinal meningo-encephalitis, 2; otogenic meningitis, 1; benign lymphocytic chorio-meningitis, 3; subarachnoid hæmorrhage, 3; head injuries, 2; cerebral glioma, 1; vaccinia, 1; seborrhæic dermatitis, 1; pityriasis, 1; acute cervical lymphadenitis, 1; belladonna poisoning, 1.

As regards penicillin therapy, it was not used actually for the meningococcal infection itself, if a case of meningitis. One man with cerebrospinal fever developed a left lobar pneumonia, and the prognosis became very unfavourable, but after forty-eight hours of four-hourly intramuscular injections of penicillin, all physical signs of pneumonia had vanished, and he made a complete recovery.

Whooping-cough.—There were only 29 admissions, of whom 19 were children, and 10 adults. In children the antipertussis vaccine in daily increasing injections of 0.25 c.c., 0.75 c.c., 1.0 c.c. and repeat the 1.0 c.c. in four days' time, and the last 1.0 c.c. dose in another seven days, gave good results. This was tried in adults, but without any apparent success. M & B 693 and its derivatives were of no avail. Ephedrine with tinct. belladonnæ were the most trustworthy stand-by.

Erysipelas.—The number of cases admitted (85) appears high amongst young soldiers who are generally in the pink of condition. The site of infection was either face or leg, and in some cases the amount of toxæmia was severe. Two cases, admitted as erysipelas with much cellulitis around the nose and over the antra, extending to the eyelids, and with grievous signs of a very acute fulminating process, died in a few hours. One gave signs of a pure blood culture of a staphylococcus and the other was identical in physical signs. One case, clinically identical with erysipelas, was suffering from respirator dermatitis.

The noteworthy remark about the cases admitted is that not one received any *local* treatment, although there was much dermatitis with blistering and encrustations. Sulph-anilamide, in preference to sulphathiazole, or sulphadiazine, was the unfailing remedy in doses starting at 2 or 3 grammes followed by 1 gramme four-hourly for forty-eight to seventy-two hours.

Cross-infection.—In spite of incessant difficulties in the complete isolation or even barrier treatment of these cases, we suffered very little from this crossing of infection, which is considered a crime in any civil hospital for infectious diseases.

How are you to keep convalescent soldier patients apart, when through the exigencies of the war they were bedded at times almost in contact with each other, and when they are playing croquet, clock golf, and deck quoits together? But I did receive a great shock when, on visiting a cubicle ward, where a man admitted with numps developed chicken-pox and another rash which I was called to see. I could not face it, and called it "urticaria," but kept him in hospital a further eight days. I nearly passed out on this visit, when I found all the patients having tea together in the end cubicle.

In spite of such and similar vicissitudes, inevitable in wartime, we have proved ourselves, throughout the whole war, a very happy team.

On the religious side, the nature of the type of cases admitted to this hospital prohibits any general Sunday Service, but the Padres of all denominations have shown particular individual interest in the patients, and for the Staff, the R.A.M.C. recreation room is used as a Chapel for Sunday Morning Service, and the proceeds from the collection have allowed of an annual contribution of £5 5s. to the R.A.M.C. (Comforts) Prisoners of War Fund, and others to such charitable associations as the British Red Cross Prisoners of War, British Legion Poppy [Earl Haig's], and St. Dunstan's, Royal National Life Boat Institution, and other Funds.

Again, the entertainments of the patients were restricted to outside games as mentioned in another part, but, as regards the staff (R.A.M.C., V.A.D. and A.T.S.), an unused ward was converted into and provided a first-class Concert Hall and Ballroom, where E.N.S.A. concerts and cinema entertainments were given. There is a very good hard tennis court, two table-tennis tables and other games; and at times we have been able to produce really creditable teams on the cricket and football grounds.

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POLIOMYELITIS IN WEST AFRICA.

BY

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ALTHOUGH poliomyelitis is of world-wide distribution it has received comparatively little attention in the tropics, largely, it would seem, because of the absence of epidemics in these regions. In West Africa, for instance, there is no recorded epidemic of poliomyelitis either among Africans or Europeans. Nevertheless the disease is well known to the local inhabitants. Our respected friend Kojo Asare, a medicine man who carries on an extensive practice in the forest region of the Gold Coast, informs us that he has seen numerous cases of acute paralysis in children: certain of these cases die while others partially or wholly recover. He carefully distinguishes between the paralysis of young and of old people (hemiplegia) from which there is no recovery.

The Hausas also recognize the disease for they have a word "Inna," literally "mother," which, according to our informants, is always used with reference to infantile paralysis, although Bargery (1934) in his Hausa dictionary translates the word as "hysterical paralysis." In Hausa the word Inna also refers to an evil female spirit, another name for whom is Doguwa, literally the "tall woman." This spirit is commonly believed to give children infantile paralysis, the phrase used being "Inna has drunk his leg" which is exactly similar to the supposed *modus operandi* of a witch in Ashanti. Incidentally Doguwa or Inna is regarded as having two manifestations, Doguwa na Gida (of the house) and Doguwa na Daji (of the bush). The former is by far the more dangerous and will paralyse the limbs of anyone who displeases her (cf. Tremearne, 1914). She appears as a character in the famous Bori dances where the spirits of disease are thought to possess their devotees. Her song at this dance is "Whomsoever she seizes, he will lose his hand. Whomsoever she seizes, he will lose his feet." It is of interest that many of the Western Fulani people (Taylor, 1931) in the Gold Coast and French Guinea use the word "Inna" for mother. Those, however, who live in Nigeria in Hausa country do not employ and often do not know this word, probably because of its evil connotation (Saunders, 1945).

Clinical observation suggests that cases of residual paralysis involving the legs are not uncommon over a wide area in West Africa and from time to time brief references to paralysis are to be found in the Annual Medical Reports of the British West African Colonies. These refer to the treatment, usually as outpatients, of persons who are regarded as suffering, or having suffered, from poliomyelitis. Only very occasionally is an acute case recorded. Turner (1932), for instance, observed an acute febrile illness with subsequent paralysis in a child in Southern Nigeria, while during the present war we have seen what appeared to be acute cases in children and young persons as far apart as Kano in Northern Nigeria and Winneba on the Gold Coast littoral. In adult Africans the disease would seem to be very rare. McAlpine (1945) and Seddon *et al.* (1945) have reported its extreme rarity in adult Indians and Maltese.

So far, however, no attempt appears to have been made to isolate the virus of poliomyelitis in British West African Colonies or to determine the incidence of immune bodies to poliomyelitis among the indigenous population. The mobilization of large numbers of African troops, who were often required to serve a thousand miles or more from their country of

origin, and the presence in West Africa of numerous young European soldiers, who had never before been in the tropics, would, it was thought, provide an opportunity for studying the behaviour of poliomyelitis under tropical conditions.

POLIOMYELITIS IN THE ARMED FORCES IN WEST AFRICA.

Unlike Egypt and Malta where during the present war extensive epidemics of poliomyelitis have been recorded among Service personnel and in Malta also among civilian children, no outbreak of poliomyelitis has occurred in West Africa either among military or civilians. Despite the fact that approximately 150,000 West African troops have been at risk the incidence of poliomyelitis has been extraordinarily small; only seven cases having been recorded in the five years from July, 1940 to July, 1945. With the exception of one at Kumasi, Gold Coast, in January, 1945, the other six cases all occurred in 1944: for this year the rate was 0.08 per 1,000 strength.

The distribution was as follows:—

Abeokuta, Nigeria	..	..	..	..	2 cases	March.
Freetown, Sierra Leone	..	..	..	..	1 case	April.
Lagos, Nigeria	..	..	..	..	1	„ June.
„	..	..	..	..	1	„ September.
Sekondi, Gold Coast	..	..	..	..	1	„ October.

The two Africans at Abeokuta belonged to different units but might have bought food in the same "Mammy" market; the oldest patient, a Kroo, was 28 years of age. All these patients recovered; their symptoms were comparatively mild. It is thus obvious that among African soldiers from 18 to 40 years of age poliomyelitis is rare. Among nearly 1,600 West African troops invalided from India and Burma for various complaints there was one case of poliomyelitis.

Among European troops of age-groups similar to those in the Middle East and Malta, though there was also no epidemic of poliomyelitis, the incidence and also the death-rate was higher than among Africans. Among approximately 40,000 British Service personnel at risk in the five years 1940–1945 there were admitted to Army hospitals 11 cases with 4 deaths. Of these 11 persons 8 were officers and 3 other ranks. The incidence of poliomyelitis in the West African Command among British officers and other ranks is shown in Table I, where a

TABLE I.—INCIDENCE OF ACUTE POLIOMYELITIS PER 1,000 IN WEST AFRICAN, INDIA AND BRITISH NORTH AFRICAN AND CENTRAL MEDITERRANEAN FORCE COMMANDS AMONG OFFICERS AND BRITISH OTHER RANKS.

Year	West Africa		India		North Africa and C.M.F.	
	Officers	B.O.R.s	Officers	B.O.R.s	Officers	B.O.R.s
1942	0.61	0.12	1.7	0.3	—	—
1943	0.56	0.09	0.5	0.1	0.87	0.08
1944	1.01	0.16	1.4	0.3	0.47	0.07
1945	1.25	—	—	—	—	—

(Jan.-Sept.)

comparison is made with figures for India and North African Commands (McAlpine, 1945). Thus, although the figures are fortunately small, there is a greater proportion of officers than men among the victims of poliomyelitis in West Africa as in other Commands: three officers and one British other rank died, a mortality comparable with that among European troops in the India Command in 1943 and 1945.

It is of interest that in the West African Command there are two other diseases which are more frequent among officers than among men—amœbic dysentery and infective hepatitis.

The distribution of poliomyelitis cases in Europeans in time was as follows:—

August, 1942	..	2 cases	March, 1944	..	1 case
November, 1942	..	1 case	April, 1944	..	1 „
March, 1943	..	1 „	October, 1944	..	1 „
April, 1943	..	1 „	April, 1945	..	1 „
May, 1943	..	1 „	July, 1945	..	1 „

With the exception of the two occurring in August, 1942, at Port Loko, Sierra Leone, there was no known relationship between any of the cases: they occurred within a fortnight of each other. The officers lived in different Messes and the survivor of the two stated that he was unacquainted with the other. There were no known civilian cases in the area at the time that these two officers were affected. Other cases occurred in Ibadan and Lagos, Nigeria; Accra, Gold Coast; and Freetown.

It will be seen that the majority of cases among Europeans and Africans occurred in the period March to October, the period of the rains. From November to March the dry Harmattan wind blows from the Sahara: pneumonia and cerebrospinal meningitis become epidemic among Africans.

CLINICAL SYMPTOMS.

The fatal cases in Europeans all ran a very acute course with symptoms of a rapidly ascending involvement of the cord ending in respiratory paralysis or quadriplegia. The biphasic character of the symptoms was much in evidence and in two cases *falciparum* parasites were found in the blood during the preliminary period of fever, which subsided after, but not because of, anti-malarial drugs.

Since so little is yet known of the virus infections endemic in West Africa the question arose whether these cases were due, not to the poliomyelitis virus, but to an agent of the type of B virus which, normally present in the saliva of monkeys, causes an ascending paralysis in man. No opportunity of isolating the virus responsible for these rapidly fatal cases of ascending myelitis presented itself till July, 1945, when an officer died from a fulminating attack. The following are briefly the clinical and pathological notes of this case, which was very similar to other fatal cases:—

Lieutenant N.Y., aged 21 years, had been in the Gold Coast and Nigeria for six months in good health. Immediately before the attack he had travelled from Ibadan to Lagos in Nigeria; thence for three days he had come by road convoy through Dahomey and Togoland to Accra where he arrived 9.7.45. For the next two days he felt a little out of sorts and on 11.7.45 he was admitted to hospital with a temperature of 102° F., headache, shivering and pains in the back: the spleen was not enlarged. He confessed that he had not been taking mepacrine 0.1 gramme per day with regularity and rings of *Plasmodium falciparum* were duly found in his blood.

He was placed on mepacrine treatment (0.8 gramme in the first twenty-four hours) and by the evening of 12.7.45 his temperature was normal and he was symptom free. On the evening of 19.7.45, he complained of slight pain in the neck and left shoulder and also had some frequency of micturition. On the morning of 20.7.45, his temperature was 101.8° F., pulse 120 and he complained of pains in the back and abdomen as well as in the neck and jaw. He had no headache. He vomited twice in the morning but apart from a furred tongue there were no abnormal physical signs. His blood was negative for malaria parasites but as the frequency of micturition continued the mid-stream urine was cultured and yielded *Bact. coli*. During the day he was alternately shivering and sweating; pain in the loins and abdomen became pronounced; abdominal tenderness was more marked on the right than the left side. The neck and shoulder pains were slight but still present. He vomited again three times during the day but in the evening his temperature was only 100.8° F., with pulse 108. He was treated as a possible case of pyelitis and given sulphathiazole and pot. citrate. On 21.7.45, his condition was unchanged but at 16.00 hours he complained of weakness in the left shoulder with tingling in the left hand; the pain in the abdomen and back was much less. At 21.00 hours there was weakness of the left palatal muscles. He was unable to abduct the left arm while the adductors were weak. Movement of the left forearm and arm was impaired and the left grip was very weak. Biceps and triceps jerks on the left side were only just obtainable, the supinator jerk was normal.

A provisional diagnosis of poliomyelitis was made.

22.7.45: Diplopia now present with severe frontal headache: difficulty of articulation, nasal voice, neck stiff; left side of palate paralysed; tongue tremulous; fine sustained nystagmus on moving eyes to the left; weakness of lumbar muscles and intercostals; swallow-

ing normal; bladder function normal; no fæces passed for the last forty-eight hours. Left biceps and triceps jerks still just obtainable but the left supinator jerk was absent.

Leucocytes: Total count 10,600 per c.mm.; polymorphonuclear cells 65 per cent, lymphocytes 24 per cent, mononuclears 9 per cent, eosinophils 1 per cent.

Cerebrospinal fluid: Clear fluid under pressure; 200 cells per c.mm.; polymorphonuclear cells 47 per cent, lymphocytes 53 per cent. Protein 60 mgm. per 100 ml.; sugar normal. By the evening paralysis had greatly increased so as to involve the muscles of the pharynx; temperature and pulse rising; restless and sleeping only for short periods.

23.7.45: 07.00 hours: respiration suddenly failed with the onset of pale cyanosis; put into Drinker's apparatus; marked fibrillary twitching of the left biceps. Throughout the day respiration became more difficult and oxygen was given continuously; consciousness was lost only fifteen minutes before death which occurred from circulatory failure and œdema of the lungs at 19.30 hours.

The post-mortem was performed within thirty minutes of death. Apart from hypostatic congestion in the lungs, enlargement of the Peyer's patches in the small intestine and engorgement of the mesenteric lymph nodes there were no macroscopic lesions. Histologically the only noteworthy lesions were in the central nervous system. The olfactory lobes, cerebral hemispheric and mid-brain showed no lesions. In the pons and to a greater extent in the medulla there was perivascular infiltration with lymphocytes but no degenerative changes in the neurones and little or no infiltration of the grey matter. In sections of the cord at all levels there was extensive perivascular cuffing with lymphocytes and polymorphonuclear leucocytes; little meningeal infiltration was noted. The grey matter of the cord showed considerable infiltration more especially in the region of the anterior horn cells. The infiltrating cells were mainly polymorphonuclear leucocytes except in the cervical region where round cells and polymorphonuclear leucocytes were about equal in number. At all levels of the cord the anterior horn cells had for the most part disappeared on the right side or were obscured by masses of polymorphonuclear leucocytes which seemed to be engaged in neuronophagia. In the lumbar region a few pale ghost-like homogeneous remains of anterior horn cells were distinguished. On the left side the anterior horn cells were more numerous but in many the nuclei stained uniformly and were eccentric. In the few nuclei of some neurones with sections stained by Giemsa's method could be seen small amorphous eosinophilic masses lying in the nucleoplasm. The histological changes were thus consistent with a diagnosis of anterior poliomyelitis.

Distribution of virus in the tissues.—As soon as it became obvious that myelitic symptoms were developing, blood and cerebrospinal fluid were removed and injected intracerebrally into mice and monkeys. No symptoms developed in these animals. At the post-mortem brain, cord and mesenteric lymph nodes were removed aseptically, ground up to form a 10 per cent suspension in broth and injected intracerebrally into mice and monkeys. Fæces were removed from the small and large intestines and, after treatment with ether, were injected intraperitoneally into monkeys.

The results of the monkey inoculations are shown in the table.

Material injected	Species of monkey injected	Result
Olfactory lobes	<i>Cercopithecus æthiops centralis</i>	Survival, no symptoms
	<i>Papio papio</i>	" " "
Frontal lobes.. ..	<i>Erythrocebus patas</i>	" " "
	<i>Cercopithecus mona roloway</i>	" " "
Pons	<i>Cercocebus torquatus</i>	Paralysis 20th day
Cervical cord.. ..	<i>C. æthiops centralis</i>	" 9th "
	" " "	" 7th "
Dorsal cord	" " "	" 8th "
	<i>C. mona roloway</i>	" 5th "
Mesenteric lymph nodes ..	<i>C. æthiops centralis</i>	Survival, no symptoms
	<i>E. patas</i>	Death 12th day, but no lesions
Fæces from small intestine..	<i>C. mona roloway</i>	Survival, no symptoms
	<i>C. æthiops centralis</i>	" " "
Fæces from large intestine..	<i>E. patas</i>	Paralysis 8th day
	" "	" 9th "

Symptoms in all monkeys were the same, slight hyper-excitability quickly followed by weakness and paralysis of the hind legs, extending upwards to the trunk and arms.

Blood and brain of each monkey were cultured for sterility when the animals were killed and in no case was any bacterial contamination present. The histological changes in all monkeys were typical of an acute poliomyelitis; numerous hæmorrhages were found through the mid-brain. The cord of a *Cercopithecus æthiops* monkey dying with paralysis after injection of cervical cord was further injected intracerebrally into two other monkeys, *Papio papio* and *E. patas* in doses of 1 c.c. of a 10 per cent suspension. The monkeys developed paralysis on the seventh and eighth days after inoculation respectively. The lesions in the cord and brain of these two monkeys were similar to those in the primary passage monkeys. Similarly an emulsion of cord from the *Cercocebus* monkey developing symptoms after injection of pons was inoculated into a *Mona* monkey which developed symptoms on the sixth day after inoculation.

Attempts to transmit the virus by intracerebral injection to mice and to bush rats *Crictomys gambianus* failed.

It is of interest that one *Patas* monkey at death was found to have a heavy infection of *Plasmodium kochi* in the blood. All monkeys when examined for malaria parasites a week or two earlier had been negative.

It will thus be seen that the virus was demonstrable in the patient's large intestine, cervical and dorsal cord and pons. The frontal and olfactory lobes showed no virus and histologically exhibited no lesions.

DISCUSSION.

The observations here recorded show that poliomyelitis undoubtedly exists in West Africa; in addition sera from West Africans kindly examined by Dr. Peter Olitsky of the Rockefeller Institute, New York, have shown the presence of neutralizing antibodies to the Lansing strain of poliomyelitis virus. These serological tests together with clinical and pathological observations show that poliomyelitis virus is widely distributed in West Africa. In view of the demonstration by Schlesinger, Morgan and Olitsky (1943) that there exists in the Middle East a strain of poliomyelitis virus similar to the original Lansing strain the pathogenicity of the West African virus to the cotton-tail rat is being investigated.

The extreme rarity of the disease among young African soldiers is remarkable in view of the fact that a low standard of hygiene and the presence of flies is universal while many Africans have been stationed away from their country of origin. The lower incidence of poliomyelitis among negroes than among whites has a striking parallel in the United States of America where it has been often noted in epidemics that negroes are attacked less frequently than whites (cf. Lewis, 1942): the resistance of the negro would seem to be due more probably to an acquired immunity than to any racial resistance.

Among Service personnel in West Africa there has fortunately been no outbreak such as occurred during the war in Malta and the Middle East: nevertheless both the incidence and mortality have been greater among European than among African troops.

There are at present two rival theories of the spread of poliomyelitis; on the one hand it is believed to spread as a droplet infection, the portal of entry being the nasopharynx, on the other it is thought to contaminate food and water, and to enter through the alimentary tract.

Seddon *et al.* (1945) in discussing the means of propagation of the Malta epidemic unhesitatingly accept the droplet nuclei theory of spread.

On the other hand since Trask, Vigner and Paul (1938), confirming earlier work, showed how easily the poliomyelitis virus could be obtained from the human faeces there is overwhelming evidence that the whole human alimentary tract from the mouth and pharynx to the colon may be a portal of entry for the virus (Sabine and Ward, 1941). In addition, poliomyelitis virus has been isolated from sewage, flies and more recently by Ward, Melnick and Horstmann (1945) from food contaminated by flies during an epidemic.

So far as it goes the evidence from West Africa is in favour of the theory of spread by faeces, flies and contaminated food. The disease occurs throughout the year as does amoebiasis and infective hepatitis but is more common in the rains: flies are even more abundant at this period and it is never easy to wean the African from the idea that the whole of Africa is a ready-made latrine. On the other hand in West Africa diseases transmitted by droplet nuclei have marked seasonal incidence. Pneumonia and cerebrospinal meningitis as well as smallpox all have their greatest prevalence during the dry dusty months of the year, when the Harmattan blows, decreasing in incidence as soon as the first rains appear at the end of March.

If poliomyelitis is carried as a droplet infection it is strange that officers both in India, the Middle East, North Africa (McAlpine, 1945) and West Africa should be more liable than British other ranks to the disease, for officers tend to live in less crowded quarters; on the other hand they invariably employ more Mess servants, and dine out more frequently, while the general supervision and hygienic standards of Officers' Messes are notoriously poor.

It has already been mentioned that in the West African Command the other diseases to which officers are more liable than British other ranks are amoebic dysentery and infective hepatitis, both of which are transmitted by the alimentary canal.

Finally, although it is unsafe to argue from a single instance, the distribution of the virus in the body of the case here described lends some support to the theory of spread by contaminated faeces.

The experimental evidence shows that West African monkeys, *Papio papio*, *Cercopithecus aethiops centralis*, *Erythrocebus patas*, *Cercopithecus mona roloway* and *Cercocebus torquatus* are susceptible to a West African strain of poliomyelitis. Previous experiments have shown that the first two species, *P. papio* and *C. aethiops centralis*, are also susceptible to a strain of poliomyelitis virus sent from the Middle East by Major C. E. van Rooyen, R.A.M.C.

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CONCLUSIONS.

Poliomyelitis is endemic in West Africa but is rare among West African soldiers. Its incidence among European Service personnel in the tropics is greater than among African soldiers. Officers are more predisposed to infection than other ranks. The virus has been isolated from the pons, cord, and large intestine of a fatal case in West Africa.

West African monkeys, *Papio papio*, *Cercopithecus aethiops centralis*, *Cercopithecus mona roloway*, *Cercocebus torquatus* and *Erythrocebus patas* are susceptible to poliomyelitis virus.

Sera from Africans in West Africa contain immune bodies to the Lansing strain of poliomyelitis virus.

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SOME MEDICO-SOCIAL PROBLEMS OF MENTAL DULLNESS IN THE ARMY.

BY

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THE tradition that dull men make good soldiers has not received scientific confirmation in the recent war. On the contrary there is evidence to suggest that many dull soldiers consume administrative time and man-power out of proportion to their usefulness. The purpose of this article is to bring to notice certain aspects of the problem which experience in this war has clearly demonstrated to be important to Service medical officers and, in particular, to report a significant positive relationship which has recently been shown to exist between subnormal intelligence and habitual delinquency in the Army.

SCABIES.

Lieutenant-Colonel G. R. Hargreaves has shown from an investigation of 30,000 recruits that a positive significant relationship exists between scabietic infestation and subnormal intelligence (Rees, 1945 ; MacKenna, 1943). In the following table (Table I) intelligence as measured by the Raven's Progressive Matrices Test is expressed in the Selection Grades (S.G.) with which Army medical officers are familiar (S.G.1 = top 10 per cent of the population ; S.G.2, 3+, 3- and 4 each = 20 per cent ; S.G.5 = bottom 10 per cent).

TABLE I.—SHOWING PROPORTION OF SCABIETIC RECRUITS OF DIFFERENT INTELLIGENCE LEVELS.

<i>Intelligence grading</i>	<i>Scabietic recruits</i>	<i>Total number of recruits by S.G.s</i>	<i>Percentage infested</i>
S.G.1	21	3,945	0.5
S.G.2	65	6,983	0.9
S.G.3+	109	9,389	1.2
S.G.3-	89	8,346	1.1
S.G.4	123	6,565	1.9
S.G.5	46	2,102	2.2

Totals	453	37,330	1.1
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Here clearly is a statistically significant demonstration that scabies has some association with poor intelligence.

PEDICULOSIS.

A similar positive significant relationship has been shown early in the war by Hargreaves to exist between lice-infestation and subnormal intelligence in A.T.S. recruits (Rees, 1945) (Table II).

TABLE II.—SHOWING PROPORTION OF A.T.S. RECRUITS INFESTED WITH *PEDICULUS CAPITIS*, IN EACH INTELLIGENCE GROUP.

<i>Intelligence grading</i>	<i>Infested recruits</i>	<i>Total number of recruits by S.G.s</i>	<i>Percentage infested</i>
S.G.1	0	23	0
S.G.2	12	171	7
S.G. +	49	268	18
S.G.3-	79	348	23
S.G.4	182	502	36
S.G.5	120	264	45

Totals	442	1,576	28
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In commenting on these observations MacKenna (1944) observes that "though none would say that a person of low mentality has a constitutional hypersusceptibility to ectodermal parasites, such a person runs more risk of contracting infestations than most people because he is less fastidious than others about his associates and also about his standards of personal cleanliness. Also, when he has contracted scabies, the subjective symptoms do not cause him the same degree of mental discomfort as they would cause an individual of superior intelligence, and the disease is therefore well established before he comes for treatment. Often it is the pain of septic lesions which have arisen as secondary complications which drives him to seek advice. Usually he does not co-operate satisfactorily in treatment. For these and other reasons one expects and finds a higher incidence of scabies and pediculosis among persons of low selection gradings—and one finds that these diseases tend to be more severe, more complicated by sepsis and more prone to relapse in these cases than when infestations are encountered in persons of greater mental ability."

DELINQUENCY.

It is known that a positive relationship exists in the civilian community between delinquency and subnormal intelligence. Goring, a prison medical officer, stated in his "English Convict," published in 1919, that "Defective intelligence is one of the primal sources of crime in this country" (quoted by Lewis, 1944). The medical officer of Pentonville Prison reported to a Royal Commission in 1904 that not less than 20 per cent of prisoners admitted to that prison showed signs of mental deficiency. Burt (1937) estimates that 10 per cent of the juvenile criminal population is grossly defective as compared with 1.5 per cent of the general population. Bagot (1941), working among juvenile delinquents in Liverpool, found that recidivist juveniles were below or very much below the mental ability of first offenders, and considered that this was an indication of a real difference between the two groups. An investigation of London juvenile delinquents (East, Stocks, and Young, 1942) did not confirm this difference.

A recent study of soldiers in the United States Army who had been convicted for absence without leave showed that 70 per cent of these men were well below average intelligence (i.e. scored 89 or less in the American "Army General Classification Test") and 20 per cent were illiterate. The corresponding figures in the rest of the population of the training centre concerned were 32 per cent and 5 per cent respectively (Guttmacher and Stewart, 1945). Another recent American study of 500 soldier delinquents (Schneider and Lagrone, 1945) in a rehabilitation centre revealed that 77 per cent were below the median in intelligence.

In the British Army in the United Kingdom a routine psychiatric examination was recently carried out on all soldiers committed to serve sentences in special military prisons and detention barracks set aside for the reception of recidivists. The intelligence gradings of 200 unselected cases have been analysed—see Table III (a). (An analysis of the psychiatric findings in the group is beyond the scope of this paper.) The significance of these figures becomes clear when the intelligence distribution of a large sample (over 200,000) of Army recruits (Table III (b)) is studied.

TABLE III.—SHOWING DISTRIBUTION OF INTELLIGENCE IN (a) RECIDIVISTS, AND (b) (FOR COMPARISON) A SAMPLE OF RECRUITS.

Intelligence gradings	(a) Recidivists by S.G.s Per cent	(b) Recruits by S.G.s Per cent
S.G.1	1	10.5
S.G.2	2.5	15.5
S.G.3+	7.5	20.7
S.G.3-	9.5	23.1
S.G.4	30.5	22.9
S.G.5	49	7.3
Totals	100	100

Of the recidivists, it will be seen that 89 per cent are below the median (i.e. S.G.3-, 4 and 5) in intelligence, and that 49 per cent fall into the last grade (S.G.5) whereas 53.3 per cent of recruits are below the median in intelligence and only 7.3 per cent fall into the last grade.

The association between mental dullness and delinquency has been admirably discussed by MacCalman (1942) in the following words: "The defective tends to become asocial in behaviour in an effort to find compensation for his failure in more legitimate activities. Other factors also drive him towards delinquency. Very often he comes, for example, from a family and neighbourhood in which discipline is lax and it is not customary to adhere to moral precepts and social conventions, or even to the law of the land. The defective requires more patient training and more obvious precept and example than those of normal intelligence, for what is called rational intelligence, i.e. the ability to judge between right and wrong in the abstract, develops late or not at all. If early influences are lax, the defective therefore becomes delinquent. Then again, the defective has less control over his appetites and impulses. His emotional life is unstable because it is less balanced by reason and judgment. He lacks foresight too, and is unable to see the consequences of any act. Finally, he is most susceptible to external influence and readily comes under the sway of some stronger and more vicious person."

CONCLUSION.

It seems clear that the intellectually subnormal members of the Army require considerable skill, patience and care so far as their initial selection and subsequent handling and employment are concerned if the best use is to be made of their abilities and their limited capacity to withstand environmental stress. These individuals must be specially considered in any social hygiene programme if they are to be a contented, happy and productive section of our civilian community rather than a social problem group and a burden on any future national health service. The special provisions made for them within the Army community (due in such large measure to the vision of Brigadier J. R. Rees) may seem to be a pointer for civilian planning.

SUMMARY.

Reference is made to certain medico-social problems presented by soldiers of subnormal intelligence.

The association between subnormal intelligence and infestation (scabies and lice) is shown.

A recent investigation of habitual soldier-delinquents is described, from which it appears that a significant positive relationship exists between subnormal intelligence and repeated delinquency in the Army.

Acknowledgment is made to Brigadier J. R. Rees, formerly Consulting Psychiatrist to the Army, and to Brigadier H. A. Sandiford, M.C., for their encouragement and advice; to Brigadier R. M. B. MacKenna for helpful criticism; and to the Army psychiatrists whose clinical data provided the material for this paper.

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TRAINING NOTES FROM BURMA.

BY

Brigadier G. J. V. CROSBY, C.B.E., T.D.

[Received November 23, 1945.]

(1) THE DIVISIONAL MEDICAL UNITS.

THE general organization of field units in the Divisions operating in the Burma theatre was based upon the old field ambulance establishment of a H.Q. capable of forming a M.D.S. and two companies each capable of forming an A.D.S. The only exceptions to this system were in the West African and East African Divisions which have adopted the British system. In the following remarks, therefore, where reference is made to the field ambulance it must be remembered that this did in fact include the M.D.S. which, by a process of evolution, became very largely the counterpart of the F.D.S. in the British organization.

The function of the field ambulance during the whole of the 33 Indian Corps operations from the battle of Kohima until the battle of Mandalay and the crossing of the Irrawaddy River was amazingly varied. The nature of the terrain, the enormous distances and climatic horrors, to say nothing of Jap activities, all contributed to a state of affairs whereby a field ambulance was at times forced to hold casualties in the forward areas until such time as evacuation became possible or the patient was fit to be moved. In such conditions it was, at times, necessary to build up what is in effect a Field Hospital by the attachment of one or more mobile surgical units (the Indian counterpart of the F.S.U.) and extra nursing personnel—even possibly female nursing officers. On the other hand, especially where evacuation was easy, e.g. when light aircraft were available and could be used, the M.D.S. became of less importance and reverted to its more normal function as a centre of emergent treatment, life-saving surgery and transfusion. The very fact, however, that life-saving surgery might have to be performed demanded that whenever possible facilities must be available to hold patients from eight to ten days.

Field ambulance commanders have always differed to some extent as to the equipment they should carry and, as a general rule, all latitude was allowed to suit a unit's predilections, in so far as transport allowed. Some units for instance always used their F.S. tentage to the utmost, others discarded it in favour of the tarpaulin, but it was noticeable that, even with the deterioration of the Japanese effort, all retained their full complement of picks and shovels.

The A.D.S. had to have an even more protean outlook. In the close hilly country, often precipitous and covered with thick jungle, a battalion or possibly a Brigade Group might well be detailed to carry out what had generally come to be called "a hook"—which consisted normally of lengthy detours across country with the object of clearing the flanks and coming in behind the enemy operating on a road or track axis. These expeditions involved the severest physical strain on all taking part and demanded a high standard of ingenuity and improvisation on the part of the medical unit or sub-unit allotted. When the size of the enterprise justified it, an effort was made to provide a mobile surgical unit or team from somewhere—often a very difficult task—to accompany the Force. On many occasions this arrangement resulted in the saving of many lives even though at times it had meant carrying casualties forward on mules, stretchers or improvised litters. At other times, cases were left, willy-nilly, with one or two nursing orderlies or sepoy and a small armed guard, to be picked up later. The mule and the jeep ambulance car had throughout the whole campaign proved themselves to be of inestimable worth.

All fighting, however, did not take place in the impenetrable "green hell" of the jungle. In the plains and in "paddy" country, the medical evacuation layout approximated very closely to that used in Europe.

(2) THE NON-DIVISIONAL (CORPS AND ARMY) UNITS.

These comprised C.C.S.s, "Malaria Forward Treatment Units" (M.F.T.U.s), Mob. Surg. Units (M.S.U.s), Field Transfusion Units (F.T.U.s), Mobile X-ray Units, Field Laboratories, Indian Dental Units for British and Indian Troops, Depots or Sub-depots Medical Stores, Indian Staging Secs. (I.S.S.s) and possibly E.N.T., Ophthalmic and Neuro-Surgical units. Motor ambulance convoys are R.I.A.S.C. units very similar to the British establishment, operationally under medical control.

During the recent campaign, there was a tendency to gather these units into groups, known as "Corps Medical Centres" (C.M.C.s), to the greatest extent possible. This was particularly the case after the introduction of Light Aircraft evacuation on a wide scale. This permitted concentration of casualties from widely dispersed fronts to a central focus, whence evacuation was usually by returning personnel and supply Dakotas or C.46s to advanced base hospital.

Such a Centre might consist of, say, two C.C.S.s (essentially surgical), two M.F.T.U.s (essentially medical and by no means necessarily only malaria) and a variety of ancillary units selected from those named above.

The siting of the Centre was necessarily a responsibility of Corps as so many considerations were involved, e.g. proximity to main supply airfields, availability of engineer resources, roads, supply, etc. The Centre had also to have its own light airstrip.

If things were moving very rapidly, it often happened that a second Centre had to be got under way while the first one was still working. This involved rapid movement, quick opening and closing and, only too frequently, the ability to deal with patients while active establishment was in progress. It did not matter therefore how small or large a medical unit might be—whether it was a field transfusion unit or a general hospital, it had to train to move light and open up quickly.

In this theatre it was necessary to build up a system of forward treatment partly in view of evacuation difficulties (in the monsoon flying may be out of the question for days) and partly to maintain man-power by getting as many patients back to their units as soon as possible. It was just as hard to get reinforcements in as it was to get casualties out. Statistics have proved conclusively the benefits of this system and the ability to give good treatment in these conditions has justified it.

The essentials learnt so far, therefore, may be summarized as follows :

- (a) A high standard of professional skill on the part of the doctor.
- (b) Sound training of nursing personnel. This should be placed very high indeed—not only for nursing of battle casualties but also of sick, who may indeed be very sick.
- (c) Good selection of cases whether for evacuation or for treatment and holding. All medical officers must be capable of acting as "triage" experts.
- (d) Capability to improvise and to make men—patients and unit personnel—as comfortable as circumstances permit.
- (e) Rapid opening and closing of all medical units. The battle drill must be impeccable and everyone must know his job. The importance of the work of the Recce and O groups is paramount.
- (f) Absolute physical fitness—so often stressed but not always fully recognized. This applies equally to the R.M.O. and the man in the C.C.S. or surgical unit.

The following are some miscellaneous points for medical officers destined for work under similar conditions in the future.

(a) Make the best of your preliminary training in tropical diseases. Pay particular attention to malaria, bacillary and amoebic dysentery, scrub typhus, smallpox and plague.

(b) The principles of war surgery are exactly the same in the East as they are in the West. The only trouble is, things are rather more prone to "go wrong" in a tropical climate. You must know the elements.

(c) Laboratory work is all important and there is any amount of opportunity for the enthusiast in this direction to develop his talents. Everyone must be able to diagnose the malarial types.

(d) Everyone in S.E.A.C. took a daily dose of mepacrine and knew all about malaria and scrub typhus prevention. The doctors have to be active propagandists and you must have the facts at your finger tips. Every M.O. must be an enthusiastic hygienist.

(e) Do not run away with the idea that the East was primitive and that medical practice was a rough and ready affair carried out in impossible conditions. We had opportunities to see and deal with material such as would never come your way in the humdrum conditions at home. Make up your mind that you are going to enjoy your tour both from the medical and military point of view and you will benefit enormously by the experience. Practically all the doctors out here were good—and knew it. There was a live atmosphere.

THE MANAGEMENT OF CONVALESCENT NEUROTICS AT THE NEUROSIS WING, 101 MILITARY CONVALESCENT DEPOT.

BY

Major C. LACK,
Royal Army Medical Corps.

[Received November 9, 1945.]

The History and Purpose of the Unit.—The object of the Neurosis Wing was to provide active methods of physical and mental rehabilitation for cases of neurosis on discharge from hospital. The transfer to this Wing of patients no longer in need of individual hospital treatment also served to relieve the pressure on the beds of military and E.M.S. psychiatric hospitals. The type of patient considered suitable for the unit was the psychiatric casualty likely to be fit for duty within twenty-eight days. In order to maintain a high standard of morale, it was most important that cases should not be sent to the Neurosis Wing who were considered medically unfit for further service.

The Neurosis Wing opened up to receive the casualties that it was anticipated would follow D-Day. The first patients were actually received in May, 1944. At the busiest period there were about 700 patients; the weekly intake being about 200. During recent months, as would be expected, the numbers steadily decreased, owing to the change in policy with regard to the low-categorised neurotic of doubtful value to the Army and because of the diminished supply of acute battle neurosis casualties.

Location.—The Neurosis Wing was in Kempston Barracks, the peacetime Depot of the Beds and Herts Regiment. It was about one mile from the rest of the Convalescent Depot, which is at Grange Camp.

Establishment.—The patients in the Neurosis Wing formed "E" Coy. of the 101 M.C.D. and the administrative work was carried out by a company commander and his regimental staff. The Home Psychiatric Pool provided a specialist in psychiatry, a military social worker, mental nursing orderlies and clerks.

The unit was fortunate in having warrant officers and N.C.O.s of the Army Physical Training Corps and Army Education Corps who were exceptionally capable of dealing with neurotics and obtaining their co-operation and interest.

Source of Intake.—After the Neurosis Wing of 102 Military Convalescent Depot had closed this was the only Neurosis Wing at a Convalescent Depot and cases were received from all military and E.M.S. psychiatric hospitals. In addition, repatriated prisoners of war who displayed mild neurotic reactions or a degree of maladjustment not necessitating hospital treatment could be sent to the Neurosis Wing direct from the 45th Division.

The Training Programme.—Under the supervision of the A.P.T.C., the patients had physical training, organized games and route marches. They also took an active part in inter-company games and every week they provided a team for competitive sports. The education periods consisted of lectures, discussions, a "Brains Trust," films and regular visits to factories in the neighbourhood.

The Grading of Patients.—Every patient on arrival from hospital reported to Grange Camp and came down to the Neurosis Wing the following day. The day's intake came to the

psychiatrist's office in the afternoon. If a fairly large number, they were seen first as a Group. It was explained to them why they had been sent to the Neurosis Wing, what they were expected to do, and they were given a general talk on the benefits they would feel if they co-operated with the training and took an active part in the sport and discussions. They were also encouraged to see the Welfare Officer immediately, should they have any problem, and not wait until they were about to depart so that nothing could be done in time. Then each man was seen individually and his documents from hospital were available. An entry was made on a card which was the only permanent record that the Wing had of any particular patient. On this document a patient's progress through the Depot was recorded. The other documents went to his unit with him when he left the Convalescent Depot. The new arrival was placed in Grade 1. This was entered on his personal card which he carried with him and which also had stamped on it the tests which he was expected to pass before he left the Wing. The intake that had arrived during one week were all seen the following Monday when they were made Grade 2 and passed fit to go on leave. On their return from leave they were Graded 3. Nine days later they were Graded 4 and the week after that they were marked available for posting. In this way each man had about five weeks on the strength of the Neurosis Wing before he was made available for posting. Any patient could be kept back in his grade if it was considered that he would benefit by further training. After they had been made available for posting, they left the Neurosis Wing for the main Convalescent Depot. Patients in an "A" category, including A.1 (H.S.), went to "C" Company, where they underwent further training until they were posted. Patients in Category "B" or "C" went to "F" Company, where they were largely employed on duties in the Depot until their posting came through from Records.

Patients could ask for a personal interview with the psychiatrist any time they liked and any patient whose ability to adjust to the life of the Neurosis Wing appeared dubious was given an appointment as there was plenty of time to carry out individual therapeutic interviews where necessary.

Occupational Therapy.—Occupational therapy was found useful for suitable cases. A scheme was devised for a special hut to be built for occupational therapy, but this never materialized. There was, however, a handicraft hut open every evening at Grange Camp and it was also possible to employ men in the Depot on suitable duties. The type of patient who benefited in this way could be roughly classified in the following manner: Men who would obtain reassurance and regain their self-confidence if given creative work to do, such as work in the handicraft hut or in the Depot Magazine Office. Then there were men who needed some sedative occupation, such as gardening, where they could work on their own at their own pace. Other patients benefited by the continual distraction of such jobs as working in the Salvation Army canteen. Patients of defective intelligence, who were due for posting to the Pioneer Corps, were employed on simple fatigues or labouring duties. These were some of the classes of patient for whom the normal training programme was modified. It was possible to employ men at the Education Centre, on carpentry, or in the "One-O-One Magazine" Office, apart from the usual run of employed jobs in a large unit.

Patients were constantly encouraged to take an active part in the training during the day and in recreational activity in the evening. In a unit of this type the patient must be given the impression that he is being handled as an individual. At this stage, when he has left the shelter of hospital, it is of the greatest importance for a patient to feel that he is a valuable member of the community and a person whom the community requires to fit into a social environment. It is necessary to watch for the inadequate and find suitable duties for him. In the same way the shy, retiring and introverted must be encouraged to take part in group discussions. In addition to the activities of the Neurosis Wing itself, there were ample entertainments carried on in Grange Camp in the way of dances, E.N.S.A. and film shows. Inter-company games, both indoor and outdoor, were encouraged. The competitive spirit introduced by inter-company sports is of value to the morale of neurotic patients.

Having patients for several weeks at a Neurosis Wing after their discharge from hospital, apart from giving them valuable opportunity for physical and mental rehabilitation, also enables the psychiatrist to watch their readjustment to a military environment and more accurate assessment of their category can be made.

During recent weeks repatriated prisoners of war were received either from Southern Hospital, Dartford, or from 45th Division. These prisoners of war presented the usual features and problems. Their predominant residual symptoms were self-conscious, dislike of company, difficulty in concentrating, absentmindedness and a feeling of being restless and unsettled. The majority responded to the facilities afforded by the Neurosis Wing and, once their co-operation had been obtained, they derived benefit from the active life and from the greater freedom than it had been possible to give them in hospital. Some of them were at first morose, disgruntled and aggressive and had been sent here on account of disciplinary problems that they had created in hospital. They were encouraged to throw themselves hard into the training and it was especially these prisoners of war who applied to join the special advanced P.T. squad in the Depot.

Disposal.—An analysis showing the disposal of patients during the quarter ending September 30, 1945, reveals that out of 344 patients, 318 (92·4 per cent) returned to duty, 10 (2·9 per cent) were readmitted to psychiatric hospitals, 9 (2·6 per cent) were boarded category "E." There were 3 admissions to military (Mental) hospitals, 1 transfer to a general hospital, 2 deserters and 1 release under Class B.

The Neurosis Wing ceased to admit patients on November 1, 1945, and closed on November 15, 1945, after a life of eighteen months, during which 4,645 patients had passed through.

Clinical and Other Notes.

MEDICAL ADVISORY DIVISION. HEADQUARTERS; GREAT EASTERN AREA.

A REPORT ON T.O.T.

BY

Colonel E. N. THUSIAST.

[Received December 10, 1945.]

MEDICAL Advisory Division's report on T.O.T. indoor spraying carried out in "A" Camp—Paradise Gardens.

The following report describes for the first time how the death-dealing, time annihilating, all-embracing benefits of the greatest insecticide and larvicide of all time were brought to the Headquarters of the Supreme Commander, Great Eastern Area. It is, perhaps, not without significance that this experiment was commenced within a week of my return to the H.Q. after my very successful experiments—reports of which have already been forwarded, at Cuttack, Chilka Lake, Jessore, Tamu and all stations in between (Reports 1, 2, 3, 4, 5 and 6).

This experiment was designed to set up the usual impenetrable death-barrier around a circumscribed area, namely a cadjan hut in the "A" camp area. This site was outstandingly favourable for such an experiment on the mosquito-annihilating power of the most outstanding insecticide and larvicide of our generation, or any other generation, namely T.O.T.

The technique in the colossal gigantic epoch-making experiment has already been described *ad nauseam* in numerous foregoing reports and, though often imitated, has never been excelled.

The reason for the favourableness of the site chosen, should it be considered expedient or even desirable that any reason should be given for any observations in this effort, is that figures for anopheline counts (*live* counts of course—not dead catch, as the mosquito-annihilating, life-destroying, stupendously breathtaking effects of T.O.T. had previously been denied to this unfortunate cadjan hut), figures—as I say—were available from the time the hut was erected.

Week ending April				Week ending August			
15, 1944	..	0	10	5, 1944	..	0	4
22	..	0	8	12	..	0	6
"	29	..	0	"	19	..	0
"	6	..	0	"	26	..	0
May	13	..	0	September	2	..	0
"	20	..	0	"	9	..	0
"	27	..	0	"	16	..	0
June	3	..	0	"	23	..	0
"	10	..	0	"	30	..	0
"	17	..	0	October	7	..	0
"	24	..	0	"	14	..	0
July	1	..	0	"	21	..	0
"	8	..	0	"	28	..	0
"	15	..	0				
"	22	..	0				
"	29	..	0				

SPECIES COUNT.

		<i>Per cent before</i>	<i>Per cent after</i>
A. Peculiarfacies var. scharthii	..	14	14
A. Immaculatus var. hutleri	..	14	14
A. Subrosa var. birtii	..	14	14
A. Jimmiensis var. hilli	..	14	14
A. Jamesi var. hilli	..	14	14
A. Maximus var. ricii	..	14	14
A. Amanuensis var. walei	..	14	14
A. Quadriceptus var. liftoni	..	14	14

It will easily be recognized that there is a striking alteration of the species counts, and this should be the subject of further research. It will be seen that these figures support the well-known theory that mosquitoes tend to avoid new buildings; the figures for the first three weeks do not support this theory and should therefore be ignored.

The room selected was an ordinary cadjan hut taken at random on the basis of which hut in the area would be likely to give results most favourable to the use of T.O.T. The area of the hut was measured accurately by pacing, and estimated roughly to have a wall area of 750 square feet which would require $1\frac{1}{2}$ pints of a 5 per cent solution of this wonderful but precious compound (T.O.T.).

Live bait: For this experiment I decided to depart from my usual practice of having live animal bait in the form of a cow (*vide* my experiments 1, 2, 3, 4, 5, 6) owing to the incomprehensible objection of the occupiers to having cow dung on the walls and floor of their office. This factor at once makes this experiment unique in my series (1, 2, 3, 4, 5, 6).

However, as the climate is reasonably warm, and the office is normally occupied by several people, and as there is a water shortage in town, I readily jumped to the conclusion that sufficient animal bait would be furnished, and thus made this experiment exactly comparable to my other reports (1, 2, 3, 4, 5, 6).

Preparation of the solution:—

This occupied the part time of 3 officers and 4 labourers for seven days. $1\frac{1}{2}$ pints of crude kerosene were obtained by the expenditure of 4 signals, 3 telephone calls, 2 15-cwt. 4×4 truck journeys and much verbiage. A quantity of the precious powder (T.O.T.) was carefully measured by a spoon of unknown capacity and tipped into the kerosene. A captain I.A.M.C. then very kindly offered to second himself from duty for three days in order to supervise personally that the valuable and potent powder (T.O.T.) dissolved in the kerosene.

SPRAYING.

As a period of four weeks had been devoted to making the power sprayer fit for service, no major delays were anticipated, and we proceeded to the target area at 09.00 hours October 23.

I had had the foresight to rope off the area, as I feared that the usual intense and natural exuberation of the ordinary people, when they heard that the magic powder had come to save them, would lead to unmanageable crowds and interfere with their salvation! However, there were no spectators except a handful with martyred expressions who had been turned out of their office for the morning, thus proving the inability of staff officers to absorb new ideas.

After an hour's delay at the start while a new power sprayer was borrowed from an outlying station, H hour on D day was announced!

The actual spraying, naturally carried out in accordance with the rules I have already laid down (*vide* my reports 1, 2, 3, 4, 5 and 6), occupied 0 minutes—later corrected to fourteen when I found out that as usual I had no idea what time it was. Thus T.O.T. at 56.4798 mgm. per square foot was accurately applied.

The normal inhabitants of the hut recommenced work at 14.30 hours the following afternoon, when they volunteered the valuable information that the nauseating stench of kerosene seemed to be wearing off.

POST-SPRAY PERIOD.

Mosquito catches—naturally all dead—for three months' post-spray period are set out below:—

				A.	C.					A.	C.
Week ending	October	28	..	0	2		December	16	..	0	1
	November	4	..	0	1		"	23	..	0	2
	"	11	..	0	2		"	30	..	0	1
	"	18	..	0	1		January	6	..	0	2
	"	25	..	0	2		"	13	..	0	1
	December	2	..	0	1		"	20	..	0	2
	"	9	..	0	2						

It will be seen that for a period of three months from the time of spraying no live anopheline mosquitoes entered this hut (as naturally they would have succumbed to the death barrier) and thus the malaria risks in this hut were at a low level only achieved by T.O.T. and in dreams.

The lower culicine counts in the post-spray period may be explained by the fact that there was—from three days after the spraying—an unfortunate absence of human bait, as all the normal occupants were discharged to hospital on this day suffering from the effects of kerosene poisoning.

This small detail should in no way be allowed to detract from the outstanding success achieved in this magnificent experiment.

Another win for T.O.T., or as I prefer to express it—

Another score

For dear trichlor.

SMILE THERAPY.¹

BY

Private E. R. HILL,

Royal Army Medical Corps.

[Received November 7, 1945.]

It is a well known fact that the recovery of Service patients from disabilities of all sorts often takes considerably longer than that of civilian patients. This is true in particular of surgical cases and where the free movement of limbs and joints has been restricted. Speaking of "Knee injuries in Soldiers," A. G. Timbrel Fisher states (*Lancet*, June 23, p. 802) that the results of removal of semilunar cartilage from Service patients "are almost grotesquely at variance with those seen under normal peacetime conditions." He accounts for this strange fact by "the longing which most Service patients feel to return to civilian life, which creates a subconscious atmosphere which is inimical to complete recovery." This, and many other observations, seems to prove that poor results with Service patients are often due to psychological causes. These causes are only too often translated into Army language as "dodging" and "swinging the lead." The problem, however, is not so simple, as we know from the many cases of traumatic neurosis which occur in industry. And what is more, the psychological background of the patient's lack of will to recover lies not only with the patient himself, but almost as much with his surroundings during treatment.

This other side of the problem, which might be of some importance, can perhaps be better seen by the orderly in the wards than by the medical officers. This is not an insolent assumption, but the mere stating of the fact that the O.R. in the R.A.M.C. is on a somehow similar mental level to most of his patients and therefore nearer to the patient's way of thinking.

Any army is, of necessity, a soulless mechanism, working in perfect order as long as it deals with numbers of considerable size. The patient, however, is out of the mechanism. He is not just one out of a number, and he has, for the duration of his disability, regained his personality to a full and often even to a painful extent. His pains and his complaints are predominant in his own mind and he thinks he has a right to be treated not only individually, but as an individual.

¹ Be it remembered that this is written from the point of view of a Nursing Orderly in the R.A.M.C. While readers may not agree *in toto* with all the writer says his paper contains much valuable common sense. In brief, it may be taken as a plea for a cheerful "bedside manner." There are some doctors (and nurses) whose very entrance into a ward suggests that the patient's next interview will be with a celestial quartermaster for "issue of wings, halo and harp." There are others who at once suggest a speedy return to the enjoyment of such good things as may yet survive in our troubled world.—Ed.

A patient reporting sick or even being admitted to hospital "falls out of the ranks." He is not a soldier, but a man with some complaint or other. The whole procedure of examination and admission makes him feel he is THE patient. But once treatment commences in the M.I. Room or in the ward, he very quickly becomes just one of the patients in the M.I. Room or ward routine. From this moment on he misses nothing, but he feels that he is no longer receiving that particular attention he received, naturally, on his admission and examination.

Whether or not a slight "mental shock" is caused, at this moment the smile therapy is indicated. It is nothing more or less than an encouraging smile and a friendly word administered together with whatever treatment is given. An extra effort and even a bit of imagination is necessary to switch the patient's mind to optimism and his will to quick recovery; all the more so as Service patients seldom realize that an unfit soldier means necessarily also an unfit civilian. If we compare that subconscious psychological atmosphere to fibrous adhesions which are broken down by the surgeon's manipulations, then we can say that mental adhesions are broken down by the manipulation of a friendly word and an interested, understanding attitude. Not answering or evading a patient's anxious question as to the nature of his disability or the state of his health means to substitute the idea of submission for the spirit of co-operation. Only too often the fact is overlooked that, for the time being, the patient's co-operation in his recovery is the only way left to him to co-operate at all. The patient is driven to a psychological defence position which, naturally, interferes with his will to recovery.

We have learned to consider the damage to the mind together with the damage to an organ, and we know of the close relationship between physical and mental well-being or illness. Surgery is complemented by exercises and occupational therapy and recreational training. Together with the physiological and physical facts we consider the psychological ones. Only that, as the patient does not live in a mental vacuum, the mental outlook and attitude of the medical staff is of no less importance than that of the patient. It is, for reasons of overwork (and sometimes for reasons of over-organization) often difficult not to commit serious offences against this principle. And it must be admitted that the greatest offenders are to be found with O.R.s who have not been taught to see the mind behind matter. An alteration of the training programme and, in many cases, a change of attitude is necessary.

The smile therapy, which, incidentally, is one of the oldest and most natural means of healing, needs patience, and effort, and time. But where it is applied, its success is just as spectacular as that of the new drugs or of modern surgery. And it doubtless is worth the effort, because it means a soldier restored to his duties and to his health within the shortest possible time. And since wars are not means in themselves, it also means to prepare a citizen for his tasks ahead.

PENICILLIN IN 100 CASES OF EARLY SYPHILIS.

BY

Captain G. O. MAYNE, M.B., Ch.B.,

Royal Army Medical Corps.

[Received October 8, 1945.]

THAT the immediate results of the treatment of early syphilis with penicillin are distinctly encouraging has already been amply demonstrated by Mahoney and Moore (1944) in the U.S.A. and, more recently, by Lloyd Jones and Maitland (1945) in this country.

The following is a brief account of the first hundred cases of early syphilis treated with penicillin in one British Military Hospital in B.L.A. during the last quarter of 1944. It serves to emphasize the findings already more fully described in these earlier papers.

THE CASE MATERIAL.

Table I classifies the cases according to the stage of the infection at the start of treatment :

TABLE I.					
Sero-negative primary	..	52	..	52	per cent
Sero-positive primary	..	42	..	42	per cent
Secondary .. ..	..	6	..	6	per cent
Total		100	..	100	per cent

It should be noted that :

- (a) The patients were all healthy men of military age in the British or allied forces.
- (b) Diagnosis was in all cases by positive dark-field examination.
- (c) The serological procedure employed was the standard Kahn test ; later the quantitative Kahn became available and was used as a routine.
- (d) Among the secondary cases is included one case of cutaneous relapse after previous insufficient arsenotherapy.

THE METHOD.

(a) *General*.—The total dosage of penicillin was 2,400,000 units in seven and a half days, administered as 60 intramuscular injections of 40,000 units each. The injections were given at three-hourly intervals, day and night.

(b) *Local*.—Saline was applied locally, except where superadded pyogenic infection necessitated the use of eusol washes, followed by the application of sulphanilamide powder.

REACTIONS TO TREATMENT.

These were, in general, negligible and called for no special measures.

(a) *The Primary Reaction*.—Headache, pyrexia, and rigors followed by sweating were exhibited in some degree by the majority of cases. The most common time of onset was after the third injection (i.e. nine to twelve hours from the start of treatment). This appeared to be a modified Herxheimer effect, since in no case was any obvious exacerbation of existing lesions noted.

The reaction was never severe, and responded well to rest in bed and aspirin. It tended to pass off spontaneously in twenty-four to forty-eight hours.

(b) *Cutaneous Reaction*.—A small number of patients developed a mild, generalized urticarial rash, more usually towards the end of the course of treatment. They showed no other signs of intolerance, and this proved to be no contra-indication to the continuance and completion of treatment.

RESULTS OF TREATMENT.

(a) Serial dark-field examinations showed that the *Treponema pallidum* vanished from the superficial lesions within nine to twelve hours of the first injection.

(b) In only two cases did the lesions heal in less than seven and half days, and the average case required several further days of hospitalization and local treatment before complete healing occurred.

(c) The average time spent in hospital is shown in Table II.

TABLE II.					
Stage	..	..	..	..	Days
Sero-negative primary	..	..	..	..	12.0
Sero-positive primary	..	..	..	..	13.7
Secondary .. ..	..	..	..	..	12.6
All cases					12.8

It will be seen that there was no significant difference in the average rate of healing, whatever the initial stage of the infection. The shortest period spent in hospital was eight days (two cases); the longest was thirty three-days (one case); while the average period of hospitalization for all cases was 12·8 days.

SEROLOGICAL FOLLOW-UP.

As was inevitable under active service conditions, we were unable to carry out a comprehensive serological surveillance on all the cases treated. However, it was possible to collect sufficient data to illustrate the trend of serological behaviour during and after treatment. Fig. 1 refers to the initially sero-negative cases only:

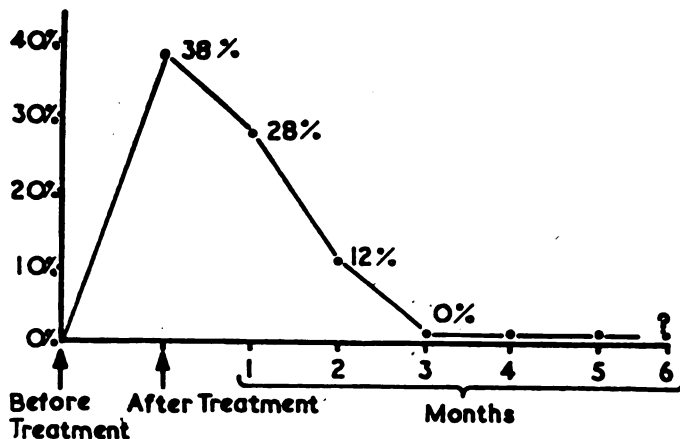


FIG. 1.—Sero-negative cases becoming positive after treatment.

It will be seen that immediately on cessation of treatment 38 per cent of originally sero-negative cases had become sero-positive. The graph illustrates the gradual downward trend of sero-positivity during surveillance, until at the end of the third month all cases were sero-negative once more, and remained so until the end of the fifth month.

After the end of the fifth month further surveillance by us was unfortunately impossible.

Fig. 2 illustrates the subsequent behaviour of the originally sero-positive cases.

Here again, unfortunately, the period of surveillance (three months) was too short, but it will be seen, from the figures available, that only 50 per cent of cases remained sero-positive at the end of the first month, and that the proportion of residual sero-positives decreased steadily up to the end of the third month.

RELAPSE.

No cases of clinical relapse were seen in this series during the admittedly short period for which these cases were under our surveillance (a maximum of five months). Moore, using half the dosage employed by us, estimates the probable eventual "treatment failures" at 10 to 15 per cent, but "the excellent record of 1,200,000 units encourages the hope that 2,400,000 units will leave a negligible margin of relapse in early syphilis" (Stokes, 1944).

CONCLUSIONS.

(1) Penicillin in the dosage described above causes the spirochaete to vanish from surface lesions within nine to twelve hours of the first injection.

(2) The average time taken for the complete healing of all cutaneous and mucous lesions was 12.8 days.

(3) The following facts are all of prime importance under active service conditions, and should prove equally valuable in civilian practice: (a) The period of initial hospitalization is little, if any, longer than that required during standard arsenotherapy. (b) The greatly reduced number of out-patient attendances. (c) The almost complete absence of toxic manifestations.

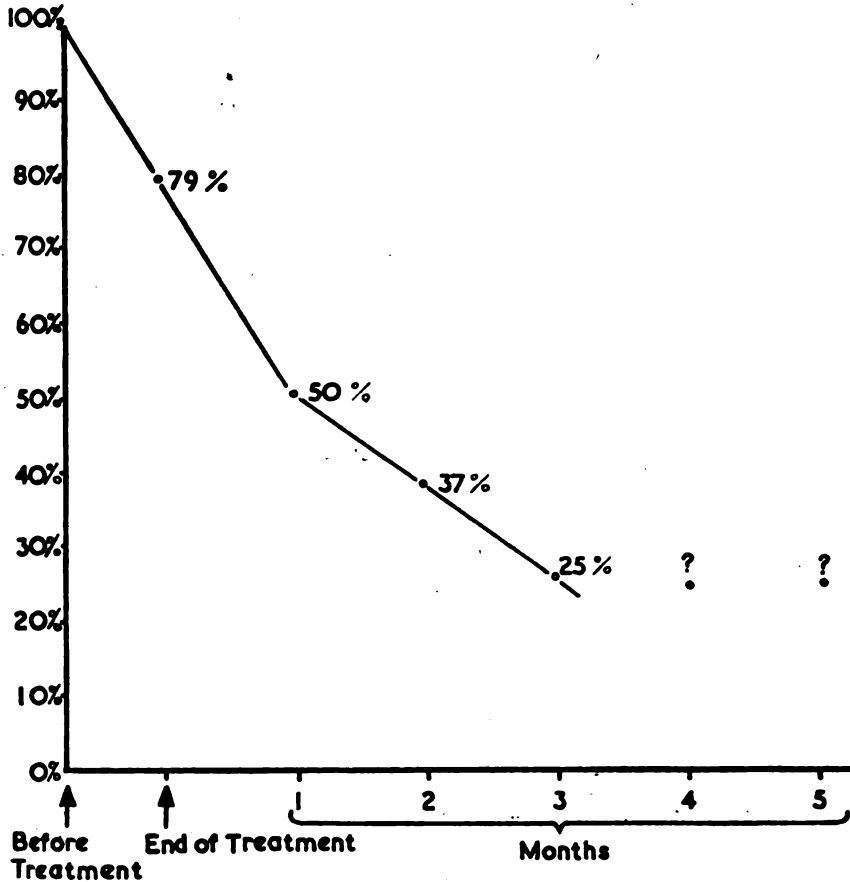


FIG. 2.—Cases still sero-positive after completion of treatment.

(4) Follow-up studies over a much longer period than has been hitherto possible will alone determine whether penicillin, singly or in combination with mapharside and/or bismuth, will justify the high expectations raised by the excellent immediate results of its trial in the treatment of early syphilis.

I wish to thank Colonel W. R. D. Hamilton, O.B.E., O.C. a General Hospital, for permission to forward this article.

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A CASE OF TRAUMATIC RUPTURE OF A HYDRONEPHROTIC KIDNEY.

BY

Major R. E. WATERSTON,
Royal Army Medical Corps.

[Received September 19, 1945.]

THE following case, which was treated in a field hospital, would appear to be of sufficient interest to warrant its publication.

A Polish soldier, aged 20, was admitted to hospital in a shocked state, complaining of right-sided abdominal pain. He gave the history of having fallen on his right side in the dark and, as he fell, being struck in the loin by the end of a blunt stake which was projecting from the ground.

His pulse-rate was 110 per minute, and it increased to 120 in the following six hours. There was gross hæmaturia with clots of blood in the urine. He vomited on two or three occasions, and the abdomen was extremely rigid and tender on the right side. This tenderness extended

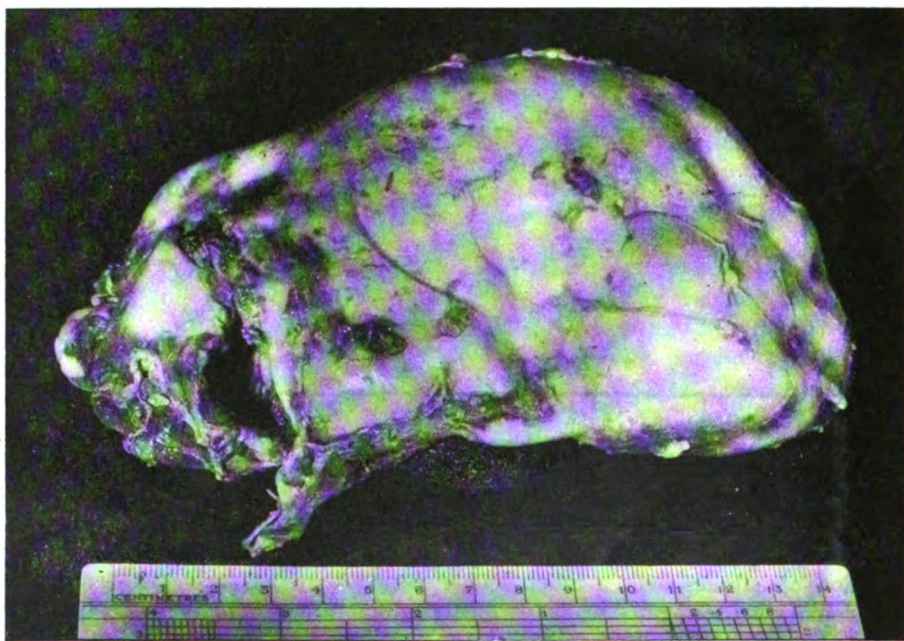


FIG. 1.—Outer aspect of the kidney showing the lobulation due to the underlying hydronephrotic cavities and the laceration at the lower pole.

into the right flank where there was evident fullness due to the deep swelling. On the left side of the abdomen there was voluntary guarding, but no deep tenderness. There was no evidence clinically of free gas and free fluid in the peritoneal cavity.

A diagnosis of ruptured kidney was made, and, in view of the increasing pulse-rate and the continuance of blood in the urine in the second and third specimens passed, it was decided to explore the right kidney.

After resuscitation the right perinephric space was opened through an oblique lumbar incision and was found to contain a large quantity of blood and blood clot. The kidney was found to be enlarged and a laceration was seen on the medial side of the inferior pole extending into the hilar region.

Nephrectomy was performed. There was no evidence of damage to the peritoneum which had been pushed forwards by the hæmatoma. The wound was closed round a tube drain.

The excised kidney was found to be grossly hydronephrotic. There were eight communicating cavities in the kidney, the thin walls of which contained only a narrow layer of kidney tissue. There was hæmorrhage in the hilar region, round the lower pole, and into some of the cavities. The hydronephrosis was of the intrarenal type, and there was but little dilatation of the pelvis; the ureter appeared normal. There was no obvious abnormal vessel, though this would probably have been obscured by clot if it had been present. There was no evidence of calculus either in the kidney or in the pelvis.

The patient's progress after operation was watched with some anxiety, as the state of his other kidney was not known. However, he passed satisfactory amounts of urine of normal specific gravity, and he showed no signs of uræmia. On being questioned further he gave no history of any previous pain or other symptoms referable to the urinary system,

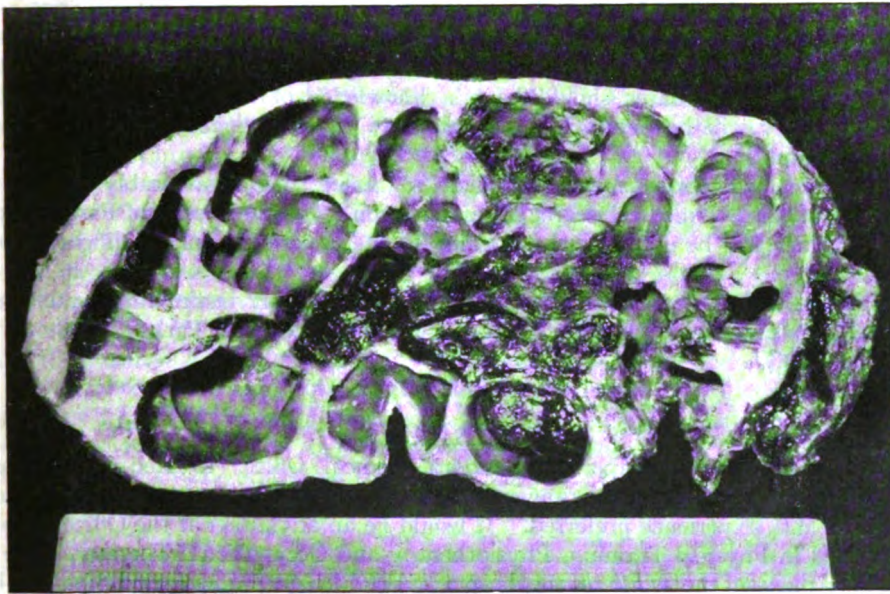


FIG. 2—Section of the kidney showing the hydronephrosis and blood clot in the interior.

and a week after operation, when intravenous pyelography was done, a normal left renal pelvis with good kidney function resulted.

He made a good recovery, and it seems that his hydronephrosis, though gross in degree, was of the unilateral idiopathic variety and, in this instance, was symptomless. The prognosis is therefore excellent.

Notices.

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APPLICATIONS are invited for the post of Assistant Medical Officer at Little Plumstead Hall Certified Institution for Mental Defectives with ancillary premises at Heckingham Institution (700 beds). The salary for the post is £550, plus residential emoluments valued at £150, but the selected candidate will be required to live out until a house can be provided, when he will be required to live in. During this period the value of the emoluments will be paid in cash. The appointment will carry the County Council cost-of-living bonus and travelling and subsistence allowances on the appropriate Council's scale. Candidates must be B1 practitioners and ineligible for or have completed their National Service. Applications stating age, qualifications and experience, together with copies of not more than three recent testimonials, should reach the undersigned not later than April 30, 1946. Persons at present serving in H.M. Forces may submit the names and addresses of three persons to whom reference can be made in lieu of submitting testimonials.

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APPLICATIONS are invited for the following posts :

(1) *Assistant Superintendent at Regent's Park Gardens.*—Candidates (male) should preferably be not more than 35 years of age. A medical degree or qualification is desirable but not essential. Candidates should have a knowledge of Zoology and administrative experience. Salary will be determined according to the experience and qualifications of the selected candidate.

(2) *Pathologist and Parasitologist.*—Candidates (male) should preferably be not more than 35 years of age. A medical degree or qualification and a knowledge of Parasitology are necessary. Salary will be determined according to the experience and qualifications of the selected candidate.

Applications, with at least four references and copies of any testimonials, must be submitted to The Secretary, Zoological Society of London, Regent's Park, N.W.8, not later than May 1, 1946.

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WANTED immediately, temporary Resident Medical Officer to Red Cross Hospital. Salary £350-£400, according to arrangements and experience, plus board and residence. One with R.A.M.C. experience preferred. It would be an advantage if the Officer appointed were interested in Physical Training, Physiotherapy and Occupational Therapy, these being an important part of the work of the hospital. Would suit someone reading for higher examinations. Applications to Commanding Officer, Middleton Park Convalescent Hospital for Head Injuries, near Bicester, Oxon.

ROYAL ARMY MEDICAL CORPS GOLFING SOCIETY.

ALL members of the Society will welcome our President's (Lieutenant-General Sir Alexander Hood, D.G., A.M.S.) decision to hold the first post-war Corps Golf Meeting this Spring. This event will take place at *Walton Heath on Thursday, June 6*—the day following the Derby and preceding the Annual Corps Dinner.

Details of the various competitions on the day will be published later in the Corps Journal. *Entries close on Saturday, May 25. A General Meeting will be held after the Competitions.*

During the last six eventful years every golfer on service must have thought on many

occasions, often under strange circumstances, or in outlandish places, of his home course or other pleasant courses he knew well in this homeland of ours and wondered when he would play on one of them in peace again. Few there can be who did not dream of the pleasant surroundings of some golf club and hope soon to see and feel a really new golf ball.

For many of our gallant and sporting comrades in arms, members of our own or sister Societies, this dream-hope of the future can never come true. We shall mourn the absence of these fine sportsmen. To the more fortunate who have survived, which includes the remnants of your Committee, the Society extends a heartfelt welcome home, and if not in time for this first post-war meeting, at least in the not too distant future, and we trust that time or ordeal by war has not seriously impaired your touch on the green or your distance off the tee.

It seems an opportune moment to repeat the message which your Captain and Committee sent you through the medium of the Corps Journal when we closed down on the day after war was declared.

"It is with much regret that your Committee has to announce the temporary suspension of the Society's activities. For the time being, the work of digging and sand shifting has become the business of the masses, without restriction to any particular Society. Largely owing to poor visibility, due to Central European fog, the length of the present nineteenth hole is nebulous and indefinite. No increase in present handicaps is contemplated. Your Captain and Committee wish all members good luck till we meet again."

If you are addicted to the "Royal and Ancient Game," join your own Corps Golfing Society and share its traditions. We won the Army Team Championship in 1926. We are looking for young talent and hope to do it again.

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Handicaps.—If any intending member has never been allotted a handicap he can obtain one from any recognized golf club or request the Society to allot him one. For this purpose he must submit three score cards (dated and showing the name of the course), signed by the Secretary or a member of the Committee of the course on which the score was made.

A revised list of members will be sent to each member in due course.

All communications to be addressed to the Hon. Sec. :

D. C. MONRO, Major-General,
Hon. Sec. R.A.M.C.G.S.,
R.A.M. College,
Millbank, S.W.1

THE ROYAL SANITARY INSTITUTE.

HEALTH CONGRESS, 1946.

THE Health Congress, which is organized by The Royal Sanitary Institute, will be held at Blackpool from June 3 to 7, 1946, at the invitation of the Corporation.

CORRECTION.

"Out from Battle."

THE Exhibition—the correct title of which was "OUT FROM THE BATTLE"—described in our November number, was the responsibility of Brigadier F. R. H. MOLLAN, O.B.E., M.C., Inspector of Medical Services. The Editor offers his apologies to the officers concerned for this regrettable mistake.

EDITORIAL NOTICES.

The Editor will be glad to receive original communications upon professional subjects, travel, and personal experiences, etc. All such articles or papers, etc., intended for publication must be submitted in duplicate through the proper channels, i.e., Commanding Officer and A.D.M.S., or D.D.M.S., to the Under-Secretary of State, War Office P.R. (C. & P.), and not to A.M.D.2, otherwise such articles are liable to be returned to the authors and this may cause delay in publication.

Correspondence on matters of interest to the Corps and articles of a non-scientific character may be accepted for publication under a nom-de-plume.

All Communications or Articles accepted and published in the "Journal of the Royal Army Medical Corps" will (unless the Author notifies at the time of submission that he reserves the copyright of the Article to himself) become the property of the Library and Journal Committee, who will exercise full copyright powers concerning such Articles. Owing to the acute shortage of paper it is necessary to limit Articles submitted for publication to the least number of pages possible. It is also desirable that the number of illustrations should be reduced.

A free issue of twelve reprints, or any lesser number to the extent applied for, will be made to contributors of Original Communications and of twelve excerpts, or any lesser number as above, in the case of Lectures, Travels, Clinical and other Notes, and Echoes of the Past. Such free reprints or excerpts will, however, only be sent to those specifying their wish to have them and a request for same should accompany the article when submitted for publication, stating the number of reprints or excerpts required.

Except as in the first paragraph above, communications in regard to editorial business should be addressed—"The Editor, JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, A.M.D.5, War Office, Whitehall, S.W.1."

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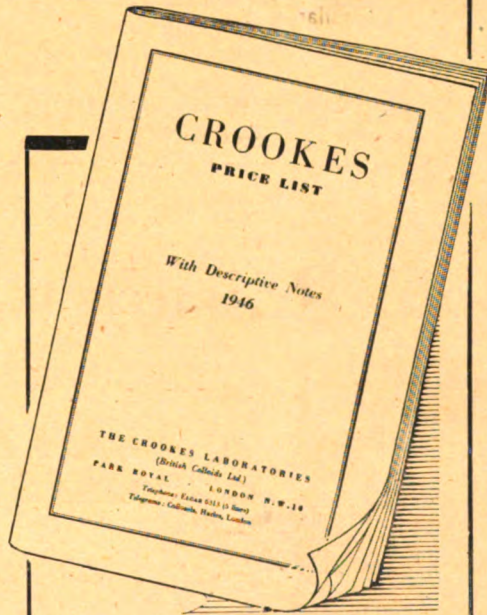
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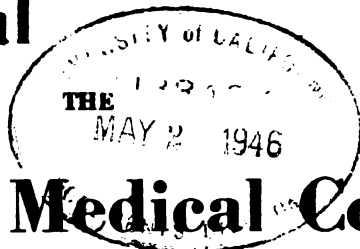
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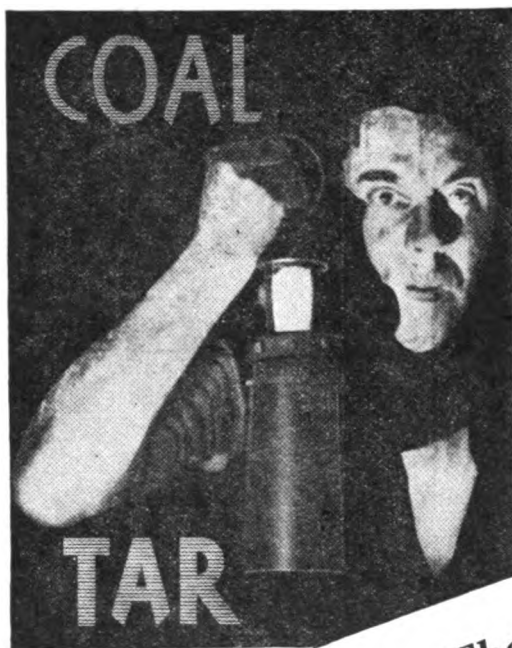
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INSECT CONTROL IN STANDING BARRACKS.

A REPORT ON THE USE OF D.D.T. IN JAMAICA,
FEBRUARY TO OCTOBER, 1945.

BY

Corporal H. G. DeMONT,
Royal Army Medical Corps.

[Received December 10, 1945.]

In the early part of 1945 D.D.T. became available in a limited quantity in Jamaica. The problems of correct usage resolved themselves into those attendant on the type of insect pests present in Jamaica, the economical use of the substance, technical difficulties and organization. That the problems were solved is due to the help and guidance from numerous well-wishers including Dr. Hill, formerly of the Rockefeller Foundation in Jamaica, Mr. Edwards and Mr. Dixon, entomologists, Jamaica, and numerous others.

It is hoped that in reporting these experiences some practical help may become available to other units faced with the problem of insect control in standing barracks. It is the purpose of this paper therefore to record the organization of insect control, to report the methods used, reasons for their adoption and to give a rough idea of control effected in Jamaica.

ORGANIZATION.

Early in 1945 Jamaica Garrison was situated in Up Park Camp with out-stations at Port Royal, on the Palisadoes, in Coast Batteries, in a hill station at Newcastle, in a large hutted camp at Mona, at Moneague and in a tented camp at Shettlewood. Most of the accommodation was found in permanent or semi-permanent wood and concrete huts of standard design which harboured insects

of many varieties. Such a garrison was scattered, varied in requirements and included a variety of units. A considerable proportion were negro troops, while white troops were in a minority.

White troops complained of a mosquito menace and from September, 1941, to September, 1945, 428 cases of dengue fever had occurred in Up Park Camp. No cases were reported in 1945 up to time of writing though this probably had no connexion with D.D.T. but with improved routine mosquito control in Up Park Camp.

Coloured or negro troops have been infested with bedbugs so much so that they became a byword. Occasional cases of malaria occur in "malarious" districts but this is not a major problem in the colony.

Cockroaches were numerous in ration stores and cookhouses in spite of careful and scrupulous cleanliness. This infestation was particularly heavy in Port Royal.

The Camp at Newcastle, where a good number of barrack rooms and store rooms had been closed for some months, was heavily infested by fleas. On entering the rooms the insects swarmed up our legs in clouds.

The choice of methods for use depended on the limited quantity of D.D.T. available, the confinement of insect pests to barracks, and the advice at our disposal. It was finally decided to start with treatment of barracks with 5 per cent kerosene solution of D.D.T., a choice later confirmed by a War Office Memorandum. This had the merit of acting as an adjustment to the anti-mosquito measures already in force without disturbing an efficient routine. Damage to useful insects was avoided (for bees remain out of doors) but at the same time a considerable number of "death-traps" were furnished for insects that invaded human habitations.

To obtain an efficient and trained unit the anti-mosquito squad in Up Park Camp, the sanitary corporal at Mona and others were trained in handling solutions and apparatus available. In this connexion the work done by L/Cpl. W. Grattan and Rfn. J. Bourdon of the Canadian Army must be mentioned, for without their enthusiasm and perseverance the routine could not have been completed. With a trained core of three or four men, and with untrained fatigue parties of six to ten, all the accommodation for a battalion could be treated in three days.

(a) Directions accompanied by a *pro forma* were sent out to each unit requesting as a rough guide the "Square footage" required to be treated. For this estimation each room was considered to be five feet high, in order to simplify calculation, which then became the sum of the length added to the breadth with a "0" on the end of it." It was considered that the very human habit of asking for twice as much as would be required would counteract any shortage. This was borne out in practice.

(b) A few days before treatment a *pro forma* covering date of treatment, preparation of solutions, provision of fatigue parties, transport, preparation by units and rations was sent to the unit.

(c) During treatment of rooms two members of the squad were required to direct proceedings while one member controlled refilling and repair of damaged

apparatus (the latter being the most important job). The unskilled fatigue party did the actual spraying and usually enjoyed it.

(d) Personal precautions against poisoning included directions to wash whenever uncovered skin became saturated with kerosene solution, the wearing of gas capes and, occasionally, respirators. Later respirators were discarded except in very small rooms. A mild degree of dermatitis developed in four men probably as much from kerosene as D.D.T. One man owed to previous skin reactions from kerosene oil. The commonest point for dermatitis was just above the boots where puttees and stockings became saturated. The provision of gum boots would be the obvious preventative. Headaches were frequent when spraying continued into the fourth or fifth consecutive days, and it was the habit in this area to space treatments at least a week apart.

TECHNICAL CONSIDERATIONS.

(1) *Dilutions.*—Powder sprays of D.D.T. were not used in Jamaica to any great extent for the reasons mentioned above and where used were found to lose efficiency quicker than solutions.

In preparing the 5 per cent solution of kerosene the following practical tips are of value :

(a) An Elastoplast (3 inches) tinful of D.D.T. is approximately seven ounces and is enough to make one gallon of 5 per cent kerosene solution.

(b) The longer the period allowed for solution the more efficient it became especially if kept in the sun for four or five days.

(c) Confirmation was found of the tips given in Army pamphlets on D.D.T. Particular reference must be made to the partial solution of all D.D.T. in a small portion of kerosene over a low flame before mixing in the kerosene drum.

(2) *Parts of Buildings Treated.*—It was decided that one gallon of solution would treat 1,000 square feet of wall space (equivalent to 200 mg. D.D.T. per square foot) as directed in Army pamphlets from Colonel J. W. Scharff, R.A.M.C., and U.S. War Department Technical Bulletin. This was later confirmed.

The walls of sleeping quarters were sprayed to a height that could easily be reached by the fatigue party and this was taken as five feet.

Cookhouses and messroom walls were completely sprayed.

In barracks badly infested with fleas the floors were also sprayed and those in which bedbugs were abundant the bedsteads received an overflow treatment.

Horse-manure heaps and garbage heaps, when discovered not to be properly packed and seen to be infested with fly-larvæ, were sprayed before they were removed.

In an attempt at fly control in cookhouses D.D.T. was mixed with white-wash and painted on the walls. Admixture is assisted if the D.D.T. powder is added to the tallow just liquefied in a low flame. The whitewash is then made up as usual.

(3) *Types of Buildings Treated.*—Barracks treated varied from those built in 1907 to those erected as late as 1943. It was noted that unpainted wooden huts, whitewashed walls, absorbable brick walls and any other porous surface

did not form a good insecticide film and required much more kerosene solution. This will be shown in the report.

(4) *Sprays Used*.—The provision of apparatus was a considerable problem.

D.D.T. kerosene solution could be used as a paint applied by brush. This was only suitable for small areas and was wasteful.

In discovering suitable sprays the problem resolved itself into that of suitable nozzles and that of reservoirs and power.

Stirrup pumps have two disadvantages. The spray jet is as a rule too coarse (unless adjustable) and the solution left behind in the bucket tends to be thrown away. Secondly they require two persons to handle them. However, these pumps are useful and handy if the nozzle can be modified. Flit sprays atomize the D.D.T. solution but are too small and too delicate for efficiency.

A paint spray with pump and pressure gauge seemed to be the ideal for a time but could not be cleaned out easily and became choked.

Most of the work in Jamaica has been done with Lowell's knapsack sprays fitted with No. 4 or 5 diaphragm nozzles suitable for the "Bordeaux mixture" for Leaf Spot Control in the Banana industry. Through the kindness of the Secretary of the Leaf Spot Control Board, Jamaica, twelve of these sprays were obtained on loan. The nozzles were such that the diaphragms could easily be removed for cleaning and the perforation small enough to leave an even film. The tubing was long enough to ensure delivery rapidly and at a distance of several feet from the body. A handle fitted with a spring tap made for easy control. The cannisters contained about two gallons each. The pump was convenient and easily repaired. It was discovered that the sheet rubber diaphragm to this pump tore and perished easily but could be more efficiently replaced by leather well treated with "dubbin."

We consider this type of spray to be most convenient, if available, because of its portability and simplicity.

DEGREE OF INSECT CONTROL EFFECTED.

In making an assessment of the results it was manifestly impossible with personnel available to formulate controlled experiments. A qualitative report was easy through the kindness of Messrs. Edwards and Dixon, Government Entomologists, Jamaica, but the quantitative assessment depended on the reports from the units. In justification of this method it is submitted that the results have been assessed by people most concerned and ready to tell us of failure.

I. *Types of Insect Destroyed*.—

(a) Cockroaches :

- i. *Blatella Germanica*.
- ii. *Periplaneta Americana*.
- iii. *Periplaneta Australasia*.
- iv. *Blaberus discoidalis*.
- v. *Nyctibora laevigator*.
- vi. *Lencophæa Maderæ*.
- vii. *Blaberus giganteus*.

(b) Bedbugs :

- i. *Cimex lectularius*.

(c) Flies :

- i. *Musca domestica*.

(d) Fleas :

- i. *Pulex irritans*.
- ii. *Ctenocepharus canis*.

(e) Mosquitoes :

- i. *Aedes ægypti* (Stegomyia).
- ii. *Culex fatigans*.
- iii. *Anopheles albanus*.

(f) Crickets :

- i. *Gryllus domesticus*.

Most of the cockroaches were flying varieties and some specimens were two and a half inches long.

In addition to the above scorpions, centipedes and spiders of several varieties were destroyed including one "Black Widow" spider.

II. *Detailed Results of Treatment.*—Results are shown under four main headings of Mosquito Control, Fly Control, Bedbug Control and Roach Control when reporting particular buildings.

(1) MILITARY HOSPITAL, JAMAICA.

Area treated : 48,000 sq. ft. on March 13 and 14, 1945.

(a) Mosquito Control : Slight nuisance, no difference noted.

(b) Fly Control : In the cookhouse area flies diminished for a day or two only. This is apparently due to the inexhaustible breeding places outside and the appearance of flies whenever food was being prepared.

(c) Bedbug Control : In local forces wards where bug infestation was extreme, complete clearance after a few days was effected for five months. In European wards no bedbug infestation was noted in six months.

(d) Roach Control : In the hospital kitchen roaches practically disappeared for five months; in the scullery no roach infestation was noted after six months.

(2) PALISADOES CAMP.

Area treated 160,000 sq. ft. on March 20 to 23, 1945.

(a) Mosquito Control : Slight nuisance, no difference noted; this camp is completely wired against mosquitoes.

(b) Fly Control : Similar results to those of the hospital kitchen.

(c) Bedbug Control : Complete disappearance of bedbugs reported.

(d) Roach Control : After considerable diminution of roaches reinfestation of cookhouses was noted after five months.

(3) BARRACK COMPOUND, UP PARK CAMP.

Area sprayed 220,000 sq. ft. on March 28 to 30, 1945.

(a) Mosquito Control : One barrack room was left untreated and the occupants complained of the mosquito nuisance. In adjoining huts mosquito nets were not used for four months.

(b) Fly Control : No real change noted in cookhouses.

(c) Bedbug Control : The infestation of the huts was very heavy. Since treatment 90 per cent. of the barrack rooms were completely free of bedbugs after six months.

(d) Roach Control : Clearance of roaches noted in cookhouses after treatment; reinfestation discovered after five months but considerably less than before treatment.

(4) GIBALTAR CAMP, MONA.

A camp of unstained wood and concrete construction. It was almost impossible to make a film on the surface of walls.

(i) 1st Area treated 80,000 sq. ft. on April 10 and 11, 1945.

(a) Mosquito Control : No obvious difference.

(b) Fly Control : No obvious difference.

(c) Bedbug Control : No bedbugs noted in August, 1945, on reopening the camp after it had been unoccupied for one month.

(d) Roach Control : Roaches plentiful in cookhouse on reopening in August, 1945.

(ii) 2nd Area treated 100,000 sq. ft. on April 30 to May 4, 1945.

(a) Mosquito Control : No result from treatment of barrack rooms.

(b) Fly Control : Some diminution of flies for about one week only.

(c) Bedbug Control : Complete elimination of bedbugs.

(d) Roach Control : Elimination of cockroaches which lasted up to five months.

(5) SMALL UNITS, MESSES, OFFICERS' MESSES, UP PARK CAMP.

Area sprayed 20,000 sq. ft. on May 17 and 18, 1945.

Individual reports vary. Taken on the whole a marked decrease was noted in the numbers of all insects after three months.

(6) HARMAN BARRACKS.

Area sprayed 44,000 sq. ft. on May 29, 1945.

(a) Mosquito Control : Nuisance slight, no difference noted. Officers sleeping in barracks on duty nights report freedom from mosquito nuisance strikingly unusual.

(b) Fly Control : A whitewashed cookhouse with ample fly screening presented an ideal experimental occasion for the use of D.D.T. in the whitewash.

5 per cent D.D.T. in whitewash was effective for two weeks.

10 per cent D.D.T. in whitewash kept the fly infestation to a minimum for six weeks.

(c) Bedbug Control : Bedbugs completely eradicated.

(d) Roach Control : No roaches detected in cookhouse.

(7) NEWCASTLE HILL STATION.

Area treated 120,000 sq. ft. on June 9 to 15, 1945.

This station presented a problem in transport and organization but spraying was completed in four days.

Numerous fleas in unoccupied quarters were cleared and had not returned in three months.

(a) Mosquito Control : No obvious change noted.

(b) Fly Control : Fly nuisance was traced to improperly disposed mule dung and rubbish tips; it was considerably abated by spraying the dungheaps, the stables and by regular carting.

(c) Bedbug Control : Bedbugs eradicated.

(d) Roach Control : Improvement noted in all cookhouses though complete eradication not effected.

(8) MONEAGUE CAMP.

Area treated 20,000 sq. ft. on July 9, 1945.

(a) Mosquito Control : Very few mosquitoes noted after treatment.

(b) Fly Control : Some diminution noted after treatment.

(c) Bedbug Control : Complete elimination obtained.

(d) Roach Control : No reinfestation in two months.

(9) SHETTLEWOOD CAMP.

Area treated 18,000 sq. ft. on July 24, 1945.

This was a tented camp with Mess rooms, cookhouses and recreation rooms in a country house.

Tented site badly flea infested; the ground near tents sprayed and eradication of fleas effected.

(a) Mosquito Control: Considerable improvement.

(b) Fly Control: No obvious improvement.

(c) Bedbug Control: None reported after treatment.

(d) Roach Control: Eradicated for two months.

(10) FORT ROCKY.

Area treated 12,000 sq. ft. on July 30, 1945.

This unit was situated on the Palisadoes in close proximity to mangrove swamps in which *Anopheles albanus* bred and was the main vector of malaria. About 12 per cent of the personnel of this fort contracted malaria from September, 1944, to January, 1945, during the rainy season only.

(a) Mosquito Control: Diminution noted for two months.

(b) Fly Control: Considerable reduction noted for a few days after treatment.

(c) Bedbug Control: Bedbugs completely eliminated.

(d) Roach Control: Roaches almost eliminated but still being found dead two months after treatment.

(11) PORT ROYAL.

Area treated 72,000 sq. ft. on July 30, 1945.

(a) Mosquito Control: No obvious change.

(b) Fly Control: No obvious improvement.

(c) Bedbug Control: Complete eradication.

(d) Roach Control: Roaches and crickets completely destroyed. It is to be noted that where repeated application was effected at this station all insects were controlled.

III. *Effects on Insects*.—It was observed that when insects were caught in the spray death was immediate. Fleas, mosquitoes, flies and roaches died in a few seconds. This was undoubtedly due to the kerosene. Later it was observed that when a roach walked over a treated surface it gave a start at first and ran up the wall. After a while it stopped climbing, then began aimlessly and in a confused fashion to walk around, finally falling off the wall to the ground and would die, often several hours later.

In one ration store the storeman would sweep out scores of dead roaches each morning for over two months.

Bedbugs are killed off within a few days. It is emphasized that D.D.T. has no immediate reaction.

SUMMARY.

(1) An organization of insect control in barracks by treatment with D.D.T. spray is described. This treatment was an adjuvant to regular mosquito control and not a replacement.

(2) Apparatus in use has been described together with minor improvisations and other technical considerations.

(3) Results show a destruction of a wide variety of insects and indicate the method to be particularly useful in bedbug control and roach control. These are insects that normally inhabit crevices in which D.D.T. might be expected to persist when applied in the manner described.

In the control of flies and mosquitoes it was shown that the effect of D.D.T. was transient. That renewed treatment of sheltering places was necessary and that a non-absorbable surface to the wall was preferable. In no way does the treatment of walls by D.D.T. replace routine sanitary and anti-malarial measures in the control of flies or mosquitoes.

It is suggested that a watery emulsion of D.D.T. not absorbed by wall surfaces would help to lengthen the effective lethal time for mosquitoes and flies.

THE MASS DETECTION OF ANÆMIA BY THE COPPER SULPHATE-BLOOD GRAVITY TECHNIQUE.

BY

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[Received August 29, 1945.]

THERE is a great need in the Indian Army for a rapid method of detecting anæmic men amongst large bodies of soldiers. The work of one of us (M. H.) in the Anæmia Investigation Team, General Headquarters, India, has shown that mild, easily curable, iron-deficiency anæmia is very common in recruits; severe macrocytic anæmia in Indian soldiers has been a medical problem of every monsoon campaign. The latter anæmia is usually very advanced before it is recognized, but something might be done towards its prevention by regular tests to detect the mildly anæmic men of forward units. Such tests have not hitherto been possible—it has been repeatedly shown that clinical examination is totally unreliable; mass hæmoglobin estimations by the Talqvist papers are quick and easy, but very inaccurate; and it is not possible to do more than five or six estimations an hour with the Sahli hæmoglobino-meter.

Phillips *et al.* (1945) showed that the hæmoglobin can be calculated from the specific gravity of whole blood, which can be very quickly and accurately determined by their simple technique. "The method is based on the fact that plasma or whole blood dropped into a solution of copper sulphate of known gravity is encased in a sac of copper proteinate, and the gravity of this discrete drop is not changed for about fifteen seconds. The rise or fall of the drop during this interval shows whether it is lighter or heavier than the solution." They derived an equation on theoretical grounds relating the blood gravity and hæmoglobin, but Hynes and Lehmann (1945) have produced a curve more nearly fitting the observed relation in Indian soldiers. The method described here is based on this curve.

PRINCIPLE OF THE METHOD.

A standard copper sulphate solution is chosen with a specific gravity corresponding to the particular hæmoglobin level above and below which people are to be grouped. One drop of finger blood from each individual is dropped into this solution. If the drop rises the individual is classified as

anæmic. By this method 70 per cent of people with hæmoglobin within 1 gramme of the chosen level, and the great majority of those beyond these limits, will be correctly classified. Since most individuals will have hæmoglobins differing by more than 1 gramme from the chosen level, we may anticipate that about 95 per cent of the group will be correctly classified.

TECHNIQUE.

Preparation of Standard Solutions.—In the field the copper sulphate solutions are best prepared from the pre-weighed salt. Any base laboratory can supply sealed ampoules containing the correct amount of finely powdered copper sulphate to make 100 ml. of a particular standard. The weight of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ needed is :—

(desired gravity—1.001) \times 159.63 grammes.

Table I shows the specific gravity corresponding to the principal hæmoglobin levels, and the weight of copper sulphate needed to make 100 ml. of the corresponding solution.

TABLE I.—THE MEAN WHOLE BLOOD SPECIFIC GRAVITY AT VARIOUS HÆMOGLOBIN LEVELS, AND THE WEIGHT OF $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ REQUIRED TO MAKE 100 ML. OF THE CORRESPONDING STANDARD SOLUTION.

<i>Hæmoglobin gm./100 ml.</i>	<i>Whole blood Specific gravity</i>	<i>Weight of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ to make 100 ml. of corresponding solution</i>
4	1.033	5.15 gm.
6	1.039	6.08 gm.
8	1.044	6.79 gm.
10	1.047	7.36 gm.
11	1.049	7.62 gm.
12	1.050	7.88 gm.
13	1.052	8.15 gm.
14	1.054	8.44 gm.
15	1.056	8.76 gm.
16	1.058	9.12 gm.

Dissolve the powder in distilled water, wash the solution into a 100 ml. volumetric flask, and make up to volume with distilled water. If distilled water is not available, only a very small error is caused by using tap-water, which even when heavily chlorinated usually contains well under 40 parts of dissolved solids per 100,000. Water which tastes very brackish or will not "lather" should not be used.

If a volumetric flask is not available, a measuring cylinder, or even a 6 oz. bottle with a 100 ml. gradation mark, may be used, for an error of 1 ml. in the volume makes an error of only about 0.2 gramme in the hæmoglobin.

The solution should be stored in 6 oz. screw-capped bottles, which should be kept firmly closed when not in use. The actual test is done in the same bottles.

The solution should be discarded after 100 drops of blood have been added, for the specific gravity of a solution falls significantly after one-fortieth of its volume of blood has been added.

If very many tests are to be done the solution may conveniently be made in 500 ml. lots and used in well-stoppered gin bottles.

Performance of Test.—Prick the finger and draw a large drop of blood into a fine teated capillary pipette. Quickly, before there is time for clotting, put the pipette into the bottle with its end 2 cm. above the surface of the solution, and let a drop of blood fall. If it sinks steadily to the bottom of the solution the hæmoglobin is taken to be above the level corresponding to the solution. If the hæmoglobin is below this level the drop will rise as soon as it has lost the downward velocity of its entry. After fifteen seconds all drops change their nature and sink to the bottom of the bottle.

It is important that the drop should break cleanly through the surface of the solution; if it has not fallen far enough it will be tied to the surface by a "tail." Such hanging drops need not be removed; they soon fall to the bottom.

Great care must be taken not to draw any air into the pipette with the blood, for an air-bubble included in the drop of blood will, of course, tend to make it float and will lower its apparent gravity.

If pipettes are not available the blood may be dropped straight from the finger into the solution in a wide-mouthed bottle. The drop which falls from the finger is much larger than that delivered from a pipette, so 100 ml. of solution serves for only 40 tests.

The standard solution should be at the temperature of the room, otherwise the drop will be the prey of convection currents. For the same reason, the bottle must not be stood in the sun, and when it is moved it should be held by the neck.

APPLICATIONS.

At the Base.—One of us (M. H.) in the Anæmia Investigation Team, General Headquarters, India, has shown that any Indian soldier with less than 14 grammes hæmoglobin, and most with less than 15 grammes, will benefit from a course of ferrous sulphate. Men in training should therefore be tested with the solution corresponding to 14 grammes hæmoglobin, and those found to be below this level should be given 6 grains of ferrous sulphate three times daily for three weeks and then re-tested.

On Active Service.—If during active service time cannot be found for the above procedure, the men should be tested against a solution corresponding to 11 grammes hæmoglobin. All men found to be below this level should be sent into hospital for investigation and treatment.

Blood Transfusion.—Donors should be rejected if the test shows them to have less than 14 grammes hæmoglobin.

Our thanks are due to the D.M.S. in India for permission to forward this paper.

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OBSERVATIONS ON AN OUTBREAK OF TRICHINOSIS AMONG GERMAN PRISONERS OF WAR.

BY

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[Received November 5, 1945.]

(1) An outbreak of trichinosis occurred in a German Prisoner of War Camp in Northern Ireland in May, 1945. The number of persons in the camp was approximately 1,200. In all, a total of 705 cases were reported, the more severe early in the epidemic, those occurring towards the end of the outbreak being, in general, mild cases and making a rapid recovery. The number of cases reported by dates was as follows :—

May	8	..	1	May	19	..	85
"	9	..	2	"	20	..	53
"	10	..	3	"	21	..	74
"	11	..	4	"	22	..	31
"	12	..	6	"	23	..	34
"	13	..	30	"	24	..	31
"	14	..	45	"	25	..	9
"	15	..	49	"	26	..	7
"	16	..	73	"	27	..	4
"	17	..	48	"	28	..	3
"	18	..	113				

(2) *Distribution of Cases.*—For purposes of administration the camp was divided into three groups. These groups ate at different sittings in the same Mess room which was served by the same cookhouse. It appeared at first that the outbreak might be largely confined to group (3), as 65 of the first 109 cases occurred in it. In one hut in this group all the personnel (27 in number) were affected. Later, however, the cases were very evenly distributed throughout the camp and the final figures were :—

Group	1	..	..	..	232	cases
"	2	..	..	..	267	"
"	3	..	..	..	206	"

(3) *Symptoms*.—In the majority of cases the symptoms were mild ; of the total number affected 88 only required admission to hospital.

(i) Oedema of the eyelids was an almost constant symptom, though there were a few exceptions. In general, the degree of oedema varied as the severity of the infection. In about 75 per cent of cases admitted to hospital either conjunctivitis or conjunctival hæmorrhage also occurred. This disappeared at the same time as the oedema of the eyelids.

(ii) Headache, either mild or severe in degree, was likewise a very usual feature.

(iii) Fever occurred in all but the mildest cases. The temperature range was from 99 to 103.

(iv) In nearly all cases complaint was made of muscular pains, but cramps were seldom noted. The muscles of the arms and legs and those of the pectoralis group were most commonly affected. In a few cases pain was accompanied by swelling and tenderness of the affected region.

(v) Gastric disturbance was rare and slight. Vomiting occurred in very few cases only ; diarrhoea was also an infrequent symptom. This is in accordance with experience in the Wolverhampton epidemic of 1940-41, where there was little or no vomiting and almost complete absence of prodromal gastro-intestinal disturbance. However, in a review of trichinosis in the United States, Hall (1937) draws attention to the fact that even in severe infections part of the classical clinical picture may be suppressed and states specifically that the stage of gastro-intestinal disturbance is absent in many cases. Its consistent absence in the present outbreak may perhaps be taken as an indication that the infection was, in general, light.

(vi) Symptoms affecting the central nervous system were, in general, absent. Two men were stated to have had convulsions before admission to hospital and a third died in hospital of apoplexy. In this case a post-mortem report revealed the cause of death to be a clot in the right cerebral artery. It was difficult to decide from histological examination whether the clot was embolic in nature or was formed *in situ*. The heart and great vessels were normal. Sections of the clot did not reveal the presence of larvæ. There appeared to be insufficient evidence to connect the death with certainty with the concomitant trichinosis infection.

(vii) Blood examination of cases admitted to hospital revealed the presence of an almost invariable leucocytosis with a greater or lesser degree of eosinophilia. In a number of cases it was noted that the eosinophilia did not develop for some seven to fourteen days after admission. The lymphocyte percentage count was usually normal or low in the early stages but later showed a tendency to rise to a figure between 30 and 70 per cent. The rise in the lymphocyte percentage was accompanied by a fall in that of the polymorphs. The eosinophil count remained high in some cases and fell in others.

The results in five cases for which full details are available are shown below :—

Case	Time in days since admission	Total	Per cent.			
			Eosinos.	Polymorphs.	Lymphos.	Monos.
(a)	1	23,400	25	62	12	1
	57	14,000	11	23	62	4
	91	10,900	5	23	67	5
(b)	1	19,200	33	57	9	1
	70	10,200	21	35	40	4
	103	6,500	6	45	45	4
(c)	1	12,500	13	55	24	3
	84	6,600	11	20	66	3
	120	6,300	1	29	65	5
(d)	1	11,300	25	68	6	1
	40	10,400	29	30	36	5
	94	8,000	19	36	44	1
	127	5,700	20	35	44	1
(e)	1	24,000	52	35	12	1
	52	7,400	34	20	41	5
	103	6,800	13	33	48	6
	140	5,600	4	46	47	3

(viii) Both the systolic and the diastolic blood-pressures were low in a number of the cases admitted to hospital. In the sample of 27 quoted in paragraph (4) below, the systolic pressure was below one hundred in 5 cases.

(4) A table is appended giving an analysis of the symptoms on admission in 27 patients, representing a sample of the total of 88 cases admitted to the P.o.W. hospital.

(5) As stated above, the more severe infections occurred early in the outbreak. Many of those who reported sick towards the end were very mild. In the absence of an epidemic a number of these cases would probably have been missed. They suffered from nothing more than slight oedema of the eyelids and it is unlikely that they would have reported sick in the ordinary course. They were found because a search was made for them.

(6) *Residual Symptoms.*—Of the total of 88 cases admitted to hospital 25 were in hospital three months later and these were examined to gauge the severity of the residual symptoms.

Nearly all exhibited minor abnormalities in the exercise tolerance test, such as undue rise of pulse-rate and blood-pressure immediately after exercise and failure to resume the former state within five minutes. But as all had been in bed for three months this, perhaps, is not surprising. A number of these cases exhibited slight oedema of the skin of the legs particularly about the ankles. The type of pitting on pressure was that of superficial oedema ; it was present both on the front and back of the legs.

Of the 25 cases only 3 caused any serious doubt :

Case 1.—Tachycardia was the predominant symptom. There was wasting of the muscles of the lower limbs which were thin and flabby. Rhombergism was present.

There appeared to be some loss of position sense in the toes. No other abnormality was found. The tendon and plantar reflexes were normal. An electrocardiogram was normal.

Case 2.—Patient had "collapsed" on first getting out of bed. The history suggested syncope. Apart from the usual exercise tolerance test changes nothing abnormal was found. The electrocardiogram was normal.

Case 3.—This was a case who had complained for some two months of persistent nausea and vomiting. At the time of examination apart from headache there were no other symptoms.

There was one case of thrombosis of extensive varicose veins. Apart from the cerebral case mentioned this is the only case of thrombosis noted in the present outbreak.

(7) *Biopsy.*—The presence of larvæ was confirmed in two cases. One developed appendicitis on April 14, 1945, and was operated on. Larvæ were found in the rectus muscle. In the second case a portion of the deltoid muscle was submitted to biopsy.

The method of examination was to crush a portion of the muscle, previously teased out, between two slides and examine microscopically.

(8) *Source of Infection and Incubation Period.*—Investigation of the diet pointed to pork sausages as the most likely cause. These are a probable vehicle of infection in an outbreak such as that under review, in which a large number of individuals are affected within a short period, as it requires but one diseased animal to infect a considerable bulk of food. The dilution of the infected material would account for the mildness of the human cases. This supposition was strengthened when it was found that the German prisoners were in the habit of eating raw pork sausages. The practice had been discontinued on April 30, after which date the sausages had been cooked. It was proved that one of the men affected had arrived at the camp on April 18. Another individual who had been transferred from the P.O.W. camp on April 28 subsequently developed trichinosis. The only date between April 18 and 28 on which pork sausages had been eaten was the 23rd; infection therefore probably occurred as the result of eating raw pork on that date. This gives a minimum incubation period of fifteen days and an average incubation period of three and a half weeks. The British Guards, numbering 250, were supplied with rations from the same C.S.D.; their rations included pork sausages from the same source, which was a local one. In their case, however, the food was cooked. No cases of trichinosis occurred among the British troops. It was shown in the investigations following the Wolverhampton epidemic that the eating of raw sausages is a more common practice even in England than is generally assumed. The danger is again proved in the present outbreak although, as would appear in this case, the habit may sometimes be indulged in with impunity for a considerable time. This experience also shows the high degree of protection afforded by thorough cooking of food.

As regards the question of the manner in which swine become infected with trichinæ, Hall and Collins (1937) are of opinion that the feeding of these animals with unprocessed garbage is a more important source than rat infestation of piggeries. Although no evidence bearing on this point is available in the present instance it is mentioned here as being of interest.

APPENDIX

ANALYSIS OF SYMPTOMS OF 27 PATIENTS ADMITTED TO HOSPITAL.

Date adm.	Blood-pressure	Leucocytes	Eosin. %	Temperature	Albuminuria	Edema of eyelids	Conjunctivitis	Muscle pain	Headaches	Gastric disturbance
12.5.45	110/80	9,800	2	100.2	Neg.	Marked	Present	No	Present	Slight
12.5.45	95/70	14,300	25	101.8	Neg.	Marked	Present	Yes	Present	No
12.5.45	95/70	11,000	15	101.8	Neg.	Marked	Present	No	No	No
12.5.45	105/80	18,800	31	102	Neg.	Present	Present	No	Present	No
13.5.45	150/95	11,200	30	99	Neg.	No	No	No	No	No
13.5.45	110/60	13,500	6	102.4	Neg.	V. marked	Present	Moderate	No	No
13.5.45	110/75	14,000	16	101.4	Neg.	Marked	Moderate	Moderate	No	No
13.5.45	120/60	8,800	14	102	Neg.	V. marked	Present	V. marked	Present	No
13.5.45	95/60	8,600	16	103	Neg.	Marked	Moderate	Moderate	Present	No
13.5.45	110/80	12,500	13	104	Neg.	V. marked	Marked	Present	Present	No
14.5.45	95/70	17,300	17	100.8	Neg.	V. marked	Present	Present	Marked	No
14.5.45	100/50	8,600	6	101	Neg.	Marked	Moderate	No	Moderate	No
14.5.45	115/90	18,200	19	102.5	Neg.	V. marked	Marked	Present	Marked	No
14.5.45	125/80	6,400	20	100	Neg.	Slight	Moderate	Present	Present	Slight
14.5.45	100/65	11,900	7	102	Neg.	Moderate	Present	Present	Present	No
15.5.45	100/70	8,000	7	101.4	—	Marked	Present	No	Present	No
15.5.45	100/75	10,200	9	101.8	—	Present	Moderate	No	Present	No
15.5.45	105/80	16,600	25	101.8		V. marked	Present	Present	Present	Slight
15.5.45	95/75	24,000	52	99.5		Moderate	Present	Marked	V. marked	Slight
15.5.45	105/80	19,200	33	102.9		Moderate	Moderate	Present	Present	No
15.5.45	115/65	23,400	25	101.5		V. marked	V. marked	Moderate	Marked	No
15.5.45	110/80	14,800	26	101		Moderate	Present	Present	Present	No
15.5.45	110/65	6,800	22	101		V. marked	Present	Present	Present	No
15.5.45	105/65	10,000	35	100		Present	Moderate	Present	Present	No
15.5.45	115/65	4,800	19	101.9		Moderate	Moderate	Present	Present	Slight
26.5.45	120/90	9,400	10	99.8	Neg.	Present	Present	Present	Present	No
26.5.45	110/95	12,600	17	98	Neg.	Marked	Present	Moderate	Present	No

SUMMARY.

An account is given of an outbreak of trichinosis. The outbreak affected 709 persons, of whom 88 required admission to hospital. With one possible exception there were no deaths. An account is given of the clinical and laboratory findings ; and the source of infection and the incubation period are discussed.

We are indebted to Brigadier R. R. G. Atkins, *O.B.E.*, *M.C.*, *D.D.M.S.*, *N.I.D.*, for permission to forward this article.

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UNDER-WATER BLAST INJURY OF THE ABDOMEN.

BY

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[Received November 5, 1945.]

DURING this war there have been a number of reports on the clinical aspects and also on experimental studies of the injuries caused by under-water blast. There are conflicting theories on the mechanism of injury, and there are differences of opinion about treatment. Two personal cases, both operated upon in the earlier days of the war, seem worthy of record as they may provide some evidence in a discussion of opposing views.

Both cases were involved in an incident which occurred during the Dunkirk evacuation. Neither of the men concerned had suffered previous injury nor were they injured when they left the deck of their mined vessel. While swimming some distance away from the sinking ship, both men felt the impact of detonating depth charges which had become submerged with the ship. They were rescued and brought to hospital about twelve hours later.

Case 1.—This patient complained of severe, generalized abdominal pain associated with frequent vomiting. He was extremely anxious and apprehensive, and was afraid to move. He was pale and cyanosed, and respirations were shallow and painful. The pulse was feeble and rapid, the skin dry and inelastic. He had no external injuries, and there was no sign of free fluid in the abdomen. Generalized, board-like rigidity, marked tenderness and silence on auscultation of the abdomen, indicated the necessity for urgent exploration, which was carried out after about two hours of resuscitation.

A right paramedian incision, splitting the rectus muscle, showed neither bruising nor hæmorrhage of the abdominal wall. There was no free fluid within the peritoneal cavity and no signs of peritonitis. The bowels were not distended; they were cold, and felt and looked "lifeless." There were numerous and widespread subserous hæmorrhages over all the loops of small and large bowel, on the stomach, and over the lower part of the right side of the liver; the hæmorrhages varied in size from a pin-head to half an inch in diameter; many were present in the mesenteries and omentum. Segments of jejunum and ileum, two or three inches in length, were discoloured, reddish and darker than neighbouring portions, by clot-like content within the lumen; these clots could easily be milked along the bowel, discolouring a new segment and leaving the previous one light again. There were faecal masses in the left colon. There was neither bowel perforation nor mesenteric tear, and no evidence of vascular thrombosis.

He died in about forty-eight hours.

Case 2.—The complaint was mainly of increasing pain in the right side of the abdomen, where the patient had felt "the violent blow" at the time of the explosion. Vomiting, in which blood was not noted or reported, had begun within eight hours. He had no signs of external injury. The general condition, colour and texture of skin and tissues, and pulse volume, were good; his tongue was coated and rather dry. There was marked

tenderness in the right iliac fossa and rigidity, which was not board-like, over the lower two-thirds of the right half of the abdomen ; physical signs, not unlike those found with appendicitis.

At operation, performed within fourteen hours of the injury, there was no sign of contusion or hæmorrhage in the abdominal wall. An early peritonitis with congestion of serosal vessels and a small quantity of free turbid fluid was present ; there were a number of scattered hæmorrhages under visceral peritoneum, but not nearly as marked or as widespread as in Case 1. In the right anti-mesocolic tænia, about three inches above the caput cæci, there was an irregular, half-inch-long tear, through which a small amount of faecal matter was oozing into the paracolic gutter. There was but little bruising of the ascending colon in the immediate vicinity of this rent in its wall, and the appearance was that of a primary laceration and not a perforation through a necrosed or contused portion. The fæces which had already collected in the gutter was cleaned away ; the rent was repaired, and the wound was closed about a drainage tube. Intravenous " drip " fluid was continued after the operation.

Post-operatively, in forty-eight hours, he developed pain in the lower part of the chest, cyanosis, dyspnoea and a painful cough, coarse rales, diminished air entry, and impaired resonance over both lower lung zones. The condition was considered to be due to pneumonia, either post-operative or post-immersion, together with, or by itself, congestion from overloading with intravenous therapy. In the light of knowledge acquired later, it seems likely that the chest symptoms and signs were due to blast-lung.

(A military posting then broke my contact with the case ; however, his subsequent favourable progress and recovery was very kindly communicated to me by Surgeon Rear-Admiral Gordon-Taylor.)

DISCUSSION.

Mechanism of injury.—The theory that injury is caused by " compression of the abdominal parietes against resistance from water which has entered the lumen of the bowel through the weak anal sphincter," as advanced by Auster and Willard (1943), does not satisfy all the clinical evidence, and the following features appear to make the hypothesis unacceptable :

(a) Case 2, reported above, had a recent, sudden perforation of the colon ; yet there was neither flooding of the peritoneal cavity with fæculent material nor sign of sea water in the peritoneum. In no other published case is sea water recorded as having been found in the peritoneal cavity at operation.

(b) Case 1, with paralytic ileus, showed no evidence of sea water in the bowel ; there were, in fact, palpable fæcal masses in the descending and sigmoid colon at the time of operation.

(c) Damage to fluid-filled cavities, such as the urinary bladder, renal pelvis and gall-bladder, is conspicuously absent in all recorded cases ; and, as emphasized by Williams (1942), injuries are usually found in gas-filled cavities.

(d) Under-water blast causes lung damage which is similar to that caused by blast in air ; and, moreover, human abdominal injury following exposure to aerial blast, though rare, has been noted (Williams, 1942, and Gordon-Taylor, 1943).

The story of the involuntary passage of frequent liquid stools soon after blast injury is quoted by Auster and Willard in support of their theory. This may, however, have other explanations : the phenomenon is known to occur

when men are exposed to other varieties of destructive and terrifying war weapons; and, secondly, massive bleeding into the bowel lumen is a common pathological result of blast injury, and this blood may constitute most of the "liquid stools."

Clinical data suggest that injury is due to sudden violent compression acting mainly on air-filled cavities. Williams (1942) reports experimental evidence in support of this theory, and he points out that, as there is no mass movement of water beyond the immediate vicinity of the explosion and no negative suction wave, it is the force of the primary pressure pulse generated by the detonation which, acting upon air-containing cavities, causes injury. The physical aspect of the action of the pressure pulse when it arrives at an air-water boundary has, more recently, been discussed by Wakeley (1945). He shows that it is at such a boundary that massive displacements occur, as evidenced by the "dome" and "plume" of water on the surface above the explosion, but that the motion of a particle of water away from the surface is very small: and this author compares this air-water boundary with that made by air-filled abdominal viscera or the pleural cavity when these are submerged. It is the walls of these organs that are submitted to the stresses of the displacing force and so suffer injury.

Pathology and Treatment.—Zuckerman (1940 and 1941) records experiments in which animals were subjected to blast in air: the outstanding result was damage to the lungs. The injuries in man, after exposure to aerial blast, are also largely confined to the chest. However, following under-water blast, the relative degrees of damage to the chest and abdominal organs in animals differ from those found in man. In the experimental work on under-water blast reported by Williams (1942) and Cameron *et al.* (1942), gross damage was either confined to the chest, or, in the small proportion of animals in which abdominal injuries occurred, it was disproportionately severe and extensive in the chest; whereas the records of human cases show that intra-abdominal trauma is commonly the dominating result of under-water blast. It would appear that the difference between the distribution of injuries sustained by man and animals may be accounted for by the fact that the greater portion of the ventral and lateral surface of the animal was under water during the experiments, but that man is usually partially submerged while swimming about in a life-jacket, and he receives the direct impact of the pressure-wave on that submerged portion facing the oncoming impulse.

The abdominal injuries in man may be of all grades of severity. Gordon-Taylor (1943) gives their range as from a mild temporary ileus to the grave condition of complete rupture. Breden *et al.* (1942) report on nine men who had been subjected to under-water blast. All suffered from early hæmatemesis, abdominal pain, and diarrhoea with melæna: seven, who presented tender abdomens and "slight rigidity" when seen by the authors three days after the event, recovered uneventfully without operative interference; the other two recovered after drainage of peritoneal abscesses which had developed gradually in nine or ten days. Such uniformly happy results do not always occur. Of the cases recorded by Pinnock and Wood (1943), five men had symptoms

suggesting serious trauma to internal organs ; one, suffering from blast lung, but without evidence of injury to abdominal organs, recovered ; the remaining four, with evidence of abdominal injuries, died. Other case reports, as by O'Reilly (1941) and Auster and Willard (1943), illustrate further that the range of injuries varies from the very slight to the grave and fatal types.

The two cases reported in this paper are both of grave severity. Case 1 demonstrates that intramuscular and mesenteric hæmorrhages may be so extensive as to cause a severe complete ileus. Case 2 shows that in addition to the gradual "silent" penetration giving rise to late abscesses and fistulæ, and in addition also to delayed perforations through bruised portions of bowel wall giving rise to general peritonitis some days after the injury, there may be a bowel perforation of a more acute and sudden nature arising at the time of the injury and causing an immediate peritonitis. The treatment of these types of cases raises anxious and pressing problems.

There is, broadly speaking, not much difference of opinion on the necessity for preliminary resuscitative measures and the care of any associated extra-abdominal lesions ; but on the question of surgical interference and exploration of the abdominal injuries there are notable differences of attitude. Blast injury of the abdomen is so often associated with other gross injuries that it presents a very grave operative risk ; the varying degrees of severity and the wide range of injuries caused by under-water blast add further to the problem. Generalization, therefore, about exploratory surgery cannot be absolute or final ; individual consideration of each case is perhaps even more emphatically necessary than for any other abdominal condition.

The argument for operating in the presence of recognized manifestations of abdominal catastrophe has strong support. Pinnock and Wood (1943) stress "board-like rigidity," and Ogilvie (1942) emphasizes "a silent abdomen," as indications for laparotomy. The first of the two personal cases recorded in this paper provides apparent contrary evidence, for although both signs were present, damage amenable to surgical treatment was not found at operation. It is likely that this case had suffered such widespread blast injury that, even if the expected perforation or gross laceration had been found, its surgical repair could not have helped recovery ; and it is likely that a wider experience and knowledge of blast injuries in general might have led to the selection of the case as one of those "upon which it is better not to operate." Consideration of such selection aside, the presence of either board-like rigidity or a silent abdomen makes it dangerous to delay exploration beyond the period necessary for the treatment of shock.

It is in the group of cases with clinical manifestations of lesser degree that most of the doubt arises. That cases exhibiting hæmatemesis, melæna, abdominal pain, and "slight rigidity," can recover without early operative treatment is evident in the series reported by Breden *et al.* (1942). But it is equally clear that, not only cases with board-like rigidity, but also those with a lesser degree of rigidity, as presented by the second of the cases reported here, require urgent early operative treatment. The problem is similar to that presented by other abdominal injuries except for the additional hazards of

possible lung damage ; and, provision for this being made by choice of anæsthetic, the policy of "look and see" would appear to be safer than an attitude of "wait and see."

SUMMARY.

Two cases of under-water blast injury of the abdomen are recorded. The mechanism of injury and the pathology are discussed ; and it is suggested that, as far as treatment is concerned, these types of abdominal injuries fall into line with others—when in doubt, it is safer to explore than to temporize.

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Editorial.

AFTER SEVEN YEARS.

TECHNICALLY we are still at war—no Peace Treaties (except that with Thailand) have yet been signed. A large proportion of our officers are still serving overseas. At the same time there is a gradual return to something approaching peacetime conditions although there are still many unavoidable shortages and restrictions. The word “austerity” is still in our everyday vocabulary.

It is felt that the time has come when we, as a Corps, may resume some of our former activities and there are signs that rehabilitation is under way. The Headquarter Mess is rapidly recovering from its experiences although there is still much to be done. When this appears the first post-war senior course will have assembled at the College. This is a definite sign of return to normality.

There is a widespread desire that some of the traditional social events associated with the Corps should be resumed as soon as is practicable. First amongst these is the Annual Dinner when old cronies can gather together and tell wond'rous tales of long ago, sighing regretfully over their part for the vanished glories of Bombay and Bermuda ; Cairo and Capetown ; Malta and Mauritius ; Poona, Pindi and Pekin ; Shanghai and Simla. This year there will be no port, but there will be more tales than ever to tell.

It has, therefore, been decided to hold the Dinner this year at Claridge's on *Friday, June 7, at 7 for 7.30*. The estimated charge is twenty-five shillings per head, exclusive of wines. The number is limited to 200 and if there are more applications for tickets a ballot will be held. For many obvious reasons it is agreed that dress will be either Service dress or lounge suits. After all the outward trappings do not matter and this will ensure a certain degree of uniformity, while not unduly taxing depleted, or non-existent, wardrobes. The dinner itself will be simple.

The question of the Headquarter Mess At Home in the afternoon is, at the time of writing, still undecided. There are many practical difficulties. However, it is hoped that something may be arranged and that ladies will not be discouraged from attending by wardrobe austerities. We are always pleased to see them whatever they may be wearing.

We understand that the Corps Sports at Aldershot will take place—come what may. There will be no strawberries and cream and there may be other dietetic restrictions but it will give an opportunity for the resumption of many old friendships.

It is hoped that the Netley Sports may also be held. “Netley Week,” alas! lives only in the memories of few and we shall never see that again.

The Annual Golf Meeting will take place and we hope to give full details in our next number. Arrangements are in the capable hands of Major-General Monro. Some have been fortunate in being able to play fairly regularly during the war. The Sunday party from Millbank was a highly organized operation with which nothing was allowed to interfere. The standard of play may, perhaps, not be so high as it was but one thing seems certain; austerity conditions will mean such a reversal of form that players are likely to hole out at the 19th in one!

This is as far as we can see at the moment. The main thing is to get all this started as soon as possible. "*C'est le premier pas que compte.*" There is no use saying: "Let us wait till next year when things will be easier." Whatever we may think and hope, next year may bring its own difficulties and had we always followed an Asquithian policy we had never done anything worth while. Therefore, let us get our old and loved reunions revived as soon as possible.

The tempo of life is changing; we now carry wounded in aeroplanes and not in Byl-gharries. The professional side of Corps work has never been higher. All the more reason why we should all meet together once in a while as fellow-craftsmen and dine quietly together discussing the past and the future; honouring those still with us who patiently toiled through the heat and burden of long days to build up our Corps; paying tribute to those who did so much in the war just ended; remembering for a moment those no longer with us whom we miss so keenly; and encouraging those who are opening up the future.

Our Corps has done much and, without indulging in any self-glorification, we can be justly proud of our achievements. There is much to be done in the future which necessitates a feeling of unity of purpose. These social functions all serve to foster that feeling of unity and, in so doing, they are an invaluable part of our Corps life.

The writer had once a unique experience. In the month of October, 1927, he visited, on duty, the four R.A.M.C. Messes in India—Lucknow, Rawalpindi, Peshawar and Bangalore. He was impressed by two things. First, the feeling of comradeship and unity so obvious in each Mess, and, secondly, their isolation from one another spiritually as well as geographically. We tend to form units within the Corps. Those who have served in Egypt—those whose memories are largely of Pindi or Poona—those who belonged to the same year or the same Senior Course—all these tend to gravitate together. As correctives we have these annual social functions held in England, when the smaller groups can feel that they are really the Corps as a whole.

It has been decided that the At Home will be held.

Clinical and Other Notes.

CHRISTMAS IN THE ARDENNES

BY

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[Received December 31, 1945.]

TOWARDS the middle of December, 1944, the Armoured Brigade in which I was an R.M.O. moved from Holland down to South-West Belgium, in order to re-equip with new tanks. It was wonderful luck, we thought, to get out of the line for Christmas and everyone was in great spirits at the thought of the weeks ahead to be spent among the hospitable Belgians.

Von Runstedt's offensive and the Ardennes Bulge seemed a long way off and of little concern to us at that moment. It came, therefore, as an unpleasant shock when, on the morning of December 20, we were told to be ready to move at 14.00 hours as an operational reserve for the Ardennes Sector.

After a long march, mostly in fog and darkness, we reached the outskirts of Brussels at midnight. Here we spent the night in an empty school. At the C.O.'s conference late that night we got our second unpleasant shock. He told us that the situation in the Ardennes was confused, but that it was thought that nine Panzer Divisions had broken through and were heading for the Meuse. Our task was to prevent the Germans crossing the river between Namur and Givet. This involved covering a 70 mile stretch, and it seemed a big assignment for one brigade for, as far as we knew, there were no other British troops supporting us.

The next day we moved down to the threatened area as fast as our tanks would allow us on their tracks. We met streams of civilians, burdened with their possessions, travelling in the opposite direction—presumably to escape what they imagined to be the return of the Huns. The atmosphere was certainly rather tense in the towns we passed through, but the people seemed cheered to see British tanks arriving on the scene. Our confidence was not raised by the sight of L. of C. troops digging slit trenches by the roadside, only 15 miles from Brussels.

We eventually reached the Meuse at Namur at 18.00 hours. My unit, the 3rd Royal Tank Regt., had the task of defending the bridge at Dinant and we travelled down the river, reaching the town at 20.00 hours. The Germans had not yet arrived though they were reported to be only 12 miles away. Two squadrons were soon in defensive positions on the far side of the river, while R.H.Q. remained on the near side.

We stayed there for the next two days, during which the situation became slightly less obscure. The "Bulge" was still slowly enlarging, though the Americans were fighting back and were beginning to get the situation under control. The spearhead of the German advance appeared to be aimed at Dinant. Our Recce patrol had soon contacted it, losing one light tank in the process, and the two forward squadrons had moved cautiously forward to meet the enemy on the second day.

I got my first casualties on the night of the 23rd, when four misguided German officers in a Jeep drove into Dinant and got a hot reception at our roadblock. The two survivors arrived at my R.A.P. in a sorry state.

The next day we were kept busy with a steady flow of wounded, mostly Americans, who often arrived back in very shot-up vehicles.

Christmas Day dawned fine and clear and it turned out to be the turning point of the battle. The weather was bitterly cold and the Meuse Valley looked very beautiful in its mantle of snow from the fall of the previous night. It was certainly a White Christmas, though we felt scarcely in a festive mood.

The course of the battle was easy to follow over our "19 set" and it soon became apparent that the Boche was getting more than he had bargained for. Tanks of the 2nd Panzer Division had advanced right up to our forward positions where they were speedily engaged by our own tanks. Before lunch-time we had knocked out seven for the loss of none of our own and the enemy withdrew, obviously impressed and surprised by the opposition.

I moved my R.A.P. 3 miles across the river during the afternoon, and set up at the Château de Sorrinnes where R.H.Q. were now established.

A force of American armoured cars had meanwhile arrived on the scene and were hotly engaging the enemy a short distance ahead of us supported by Lightnings of the U.S.A.A.F. A scene of carnage and death was apparent in the blazing farms and villages in the vicinity and we were kept very busy collecting wounded. Our own losses had been remarkably light considering everything and those we evacuated were largely American and German.

Tired, but feeling decidedly more confident, we celebrated Christmas night at the old Château with a bottle of Dutch gin, hoping that the Boche would not have recovered sufficiently to counter-attack that night. As it turned out we were lucky.

Boxing Day was again a cloudless day and the Air Forces certainly made the most of the weather. Hundreds of aircraft passed over and from the roof of the Château we watched rocket-firing Typhoons diving to attack the battered Panzer forces. Column after column of black smoke arose, denoting the destruction of more of Runstedt's tanks.

After that day it was obvious that the "go" had been knocked out of the Ardennes offensive and the Bulge was slowly squeezed back.

We were withdrawn South into reserve into the Rochefort-Beuraing area where we stayed for the next three weeks, billeted in tiny villages amidst the wintry-looking forest.

Some of the time we spent hunting the boar which dwelt in the surrounding country—a novel sport to most of us and I fear our weapons were deplorably

unorthodox, ranging from hand grenades and Sten guns to rifles and revolvers. The largest boar was, incidentally, slain by a Rifle Brigade officer with his revolver.

However, it was by no means a period of rest as far as I was concerned. When the "flap" had started, many of the civilians, including all the doctors in the area, had evacuated themselves to the West. Consequently I soon found myself with an ever-increasing civilian practice.

The snow was now between 1 and 2 feet deep with the temperature between 20° and 30° below freezing point most of the time, so that evacuation of serious cases to civilian hospitals was made practically impossible in our district. The drugs I carried round with me were scarcely adequate to deal with some of the cases, but I managed to supplement them by a little scrounging in the district.

One night I was called to see a young girl of 18 with pneumonia. She was extremely dyspnoeic and cyanosed and evidently very ill. I started her on M & B 693 but her condition had worsened when I went to see her the next morning. Oxygen was needed and it was then that I remembered that the unit fitters carried some with them for use in welding. They gladly co-operated and we heaved the immense cylinder up to the girl's room. I had meanwhile obtained a BLB mask and we soon had it functioning satisfactorily. She used it frequently during the next few days with marked relief and when we later left the area she was well on the way to recovery.

Two midwifery cases also cropped up, both fortunately uncomplicated. One we were summoned to at the usual midnight hour, and the Padre and I set out for the village 5 miles away in a half-track. It was blowing a blizzard and I had difficulty keeping the heavy machine on the icy road. On arrival we found a considerable assembly gathered at the bedside consisting of the husband, five children, and a singularly helpless "help" from next door. I was at least relieved she was a multipara. The assembly having been dispersed, I examined the mother. Things seemed to be progressing satisfactorily and I did not anticipate a long wait. My hopes were confirmed an hour later when a small boy arrived without mishap, the Padre enthusiastically rushing round with bowls of hot water.

When I visited the good woman the next day, I was horrified to find her up and scrubbing the front-door steps! Never having stayed in bed after her previous confinements, my protests did little to make her change her customs.

Other cases of unusual interest to an R.M.O. included a woman in diabetic coma and an old man who had cerebral hæmorrhage. Treatment of these was not so successful, though the diabetic was alive when we left the area.

It was with mixed feelings that I heard we were to leave the Ardennes on January 16th. It had been an interlude full of excitement and interest and, though we felt cheated of our Christmas, we made up for it with the customary celebrations a month late.

JOSIAH MACY, JR. FOUNDATION.

[Received December 31, 1945.]

DOCTOR RAPPLEYE, President of the Foundation, announces that more than five million copies of over four hundred leading medical and scientific articles have been published by the Foundation's War Reprint Service during the last three years for medical officers of the armed forces of the United States and, in so far as possible, Canada, England, New Zealand, Australia, the Union of Socialist Soviet Republics and China. Dr. Rappleye stated that with the plans for demobilization of the armed forces the Reprint Service will be discontinued by January first.

The Reprint Service of the Foundation has been an effort to bring new and important developments in the science and practice of medicine to medical officers who were largely cut off from the sources of medical information during the war. In the selection of these articles the Foundation has had the active co-operation of the Committee on Pathology of the National Research Council and of the National Committee for Mental Hygiene. The articles selected for reprint and distribution were those dealing with the most recent scientific developments that had a direct bearing on medical and health problems related to military service. The distribution to the medical officers was worked out in co-operation with the Surgeons General of the Army and Navy and the Air Surgeon. Through the courtesy of the National Committee for Mental Hygiene, more than one million reprints were delivered to neuro-psychiatric medical officers.

In addition to the articles reproduced from journals the Foundation has published for the Air Surgeon five original monographs, prepared by medical officers of the Army Air Forces, dealing with personality disturbances occurring in combat zones. Over 95,000 copies of these monographs were distributed by the Reprint Service as official documents of the Office of the Air Surgeon. Eight additional monographs and nine reviews of medical literature on subjects of military interest have been prepared and 70,000 copies distributed. Since August, 1944, a News Letter for the Rheumatic Fever and Streptococcus Control Program of the Army Air Forces has been published monthly for the Air Surgeon, and over one thousand copies each month have been mailed to interested medical officers, military hospitals and medical school libraries. Through the co-operation of the Interdepartmental Committee on Cultural and Scientific Co-operation of the Department of State, sixty thousand reprints have been distributed to medical teachers and investigators in forty-eight foreign countries. The Office of War Information requested permission to circulate the Foundation's reprints among more than thirty of their foreign Outposts, and has reduplicated selected articles for their distribution to medical leaders abroad.

Dr. Rappleye stated that the Foundation has expended over two hundred and twenty-five thousand dollars in financing the War Reprint Service.

A SIMPLE SHELTER.

BY

Colonel R. JOHNSTON,
Royal Army Medical Corps.

[Received December 14, 1945.]

COMMENTARY.

EXPERIENCE in the Western Desert campaigns, the Italian summer campaign of 1944, and, one is informed, in the invasion of Normandy, has demonstrated that an alteration in the present G. 1098 scale of tentage for Divisional medical units is desirable.

A Field Ambulance now has :

- (a) 3 — 160 lb. tents.
- (b) 2 — 30 × 30 shelters, portable, No. 11 (or alternatively 3 — 30 × 20s).
- (c) 1 — shelter, portable, No. 10 (12 cases).
- (d) 14 — shelters, portable, No. 14 (penthouses).

In the desert, along a difficult line of evacuation, a large number of casualties had to be admitted and often held overnight, and there were, of course, no buildings available. Field ambulances, therefore, needed large and “roomy” canvas shelters to fulfil this function, and many ingenious types were evolved.

In the Italian campaign, it was rare to find a suitable building in a tactically advantageous position for use either as an A.D.S. or, more especially, as a M.D.S. Only too often has one seen A.D.S.s, located in buildings and villages, heavily shelled, while difficulties of expeditious ingress and exit are almost invariably present—steps, stairs, narrow doorways and passages with awkward corners—giving rise to confusion and delay, and accommodation must, of necessity, be limited.

The A.D.M.S. of a veteran Division engaged in the Normandy campaign writes that the large canvas shelters which this Division has been using since the battle of Gazala in 1942, through the Desert campaigns, in Sicily, Italy and ultimately in France, “have been an enormous help.”

To be satisfactory, a shelter should have the following criteria :

- (1) It should be well ventilated and “roomy.”
- (2) It should be easy of “blackout,” and lightproof during the hours of darkness.
- (3) It should be weatherproof.
- (4) It should not increase the width of the vehicle, as this is a great disadvantage along the narrow roads and lanes of the Continent, and almost certainly entails damage to the penthouse structures sooner or later.
- (5) It should be simple and quick to erect and dismantle.

While it is felt that the shelter suggested in this note is not by any means the final answer to the problem, it is submitted that it will fulfil a practical purpose and be of great assistance to such units as are still on active service, pending an alteration in the scale of tentage as at present laid down.

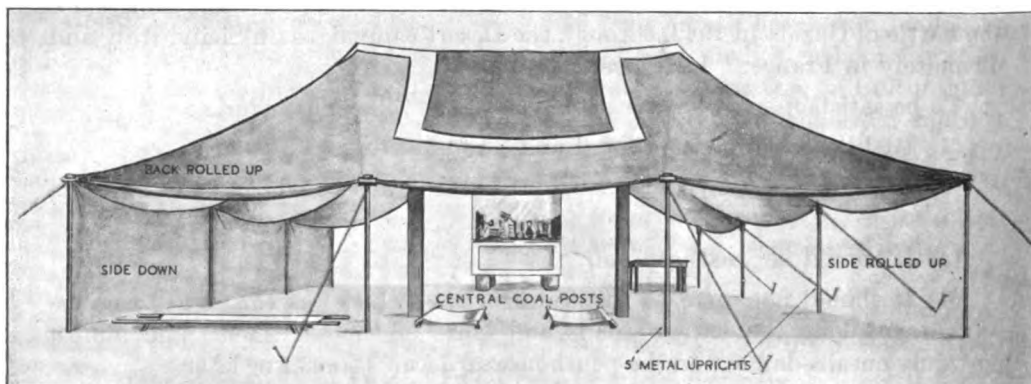
ERECTION.

The shelter in detail, requires :

- (a) 1—40 × 40 canvas sheet.
- (b) 20—1' 0" square canvas patches for reinforcement.
- (c) 10— $\frac{1}{4}$ " thick 6" long pieces of leather.
- (d) 3—1' 6" metal bars.
- (e) 10—5' 0" metal uprights (vehicle super-structure material—salvage).
- (f) 2—8' 10" wooden uprights.
- (g) 1—7' 6" wooden horizontal.
- (h) 13—lengths of 10' 0" 1 in. rope.
- (i) 10—2' 0" " angle iron " tent pegs.
- (j) Odd bits of canvas to form " blackout " and hessian for use as buffers.
- (k) Finally, the skill of a unit saddler or bootmaker and the co-operation of a R.E.M.E. or R.A.S.C. workshop section.

The shelter, which weighs 600 lb. (i.e. 100 lb. more than an E.P.I.P. tent), is normally erected from the rear of the 3-ton G.S. vehicle which carries it and medical supplies in accordance with its operational function. Whether that be a Light Section, M.I. Room and Reception of a M.D.S., Medical " holding " Ward or Resuscitation Shelter, the vehicle does not require to be completely unloaded and acts as a store-room for drugs, dressings, etc.

Eight men and approximately ten to fifteen minutes are required to erect the shelter. It provides approximately 1,000 feet of floor space, and can receive 30 to 35 lying patients with ease of ingress and exit. 40 lying cases can be placed under cover in an emergency.



The criticism that these shelters require a vehicle for their erection does not hold good for the type herein suggested. By tying the front to a suitable tree or by using two "goal posts", instead of one, the shelter can be erected entirely independently. They have been conveyed by Jeep, in an area accessible only to this type of vehicle, and used for the reception and treatment of casualties at a height of over 4,000 feet. In forward areas, part or whole of the floor space can be dug down below ground level for the protection of casualties.

The ventilation is excellent, due to the fact that one, two, or all three sides can be rolled up without any effect on the shelter's stability or function. The illustration gives a good general idea of its appearance.

I am indebted to Major-General H. C. D. Rankin, *C.I.E.*, *O.B.E.*, M.B., D.D.M.S., H.Q., Eastern Command, for permission to forward this note for publication.

A METHOD OF FIRST-AID SPLINTING FOR A FRACTURED HUMERUS WITH CRAMERS WIRE.

BY

Captain S. F. M. CRESSALL,
Royal Army Medical Corps,

[Received February 17, 1944.]

It has been noticed that battle casualties suffering from compound fracture of the humerus not infrequently stand long and rough ambulance journeys very badly, being in a considerably shocked condition on arrival at the Main Dressing Station. It is suggested that this may often be due to inadequacy of first-aid splinting.

Though in no way intended as an alternative to the early application of a thoraco-brachial plaster of paris splint it is submitted that the method described below will provide comfortable and substantial immobilization until the surgeon can be reached.

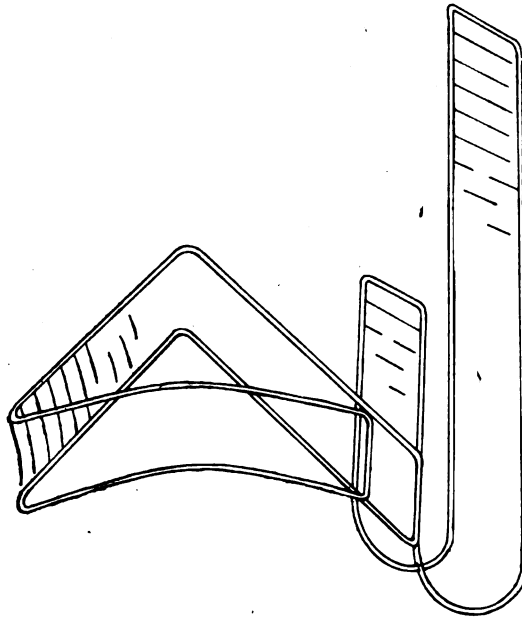
The splint is easily prepared and packed in two separate pieces which can be joined together so as to fit either arm. Thus, being fairly quick to apply, it is useful in forward evacuation areas. Moreover if the patient is fit to be moved sitting and this should be necessary it is claimed that he will be more comfortable with this type of first-aid splinting.

TO PREPARE THE SPLINT.

Two pieces of standard 3 ft. Cramers Wire splinting are required. One piece is bent with the concave surface outermost into the form of a triangle with 4 in. overlapping at one angle and tied firmly at the junction. The side of the triangle overlapped by this is bent inwards a little so as to curve slightly

round the front of the abdomen at waist level. The other piece is bent in the form of a "J" with the concave surface of the splinting innermost. The curved base of the "J" should be sufficiently wide to accommodate the patient's elbow comfortably, i.e. about $3\frac{1}{2}$ in. across, and the short limb long enough to project up the side of the patient's chest, medially to the injured arm, leaving about an inch clearance between the elbow and the base of the "J" without being thrust into the axilla, i.e. about 10 in. long. The long limb of the "J" should be long enough to project up the outside of the injured arm to about one inch above the shoulder when it can be cut short or bent over.

The short limb of the "J" is tied firmly just above the curve of the "J" to the 4 in. overlap of splinting at one angle of the triangle, so that the "J" is at right-angles to the plane of the triangle with the long limb outermost from it. The "J" and adjoining limb of the triangle are then padded with wool and roller bandages.

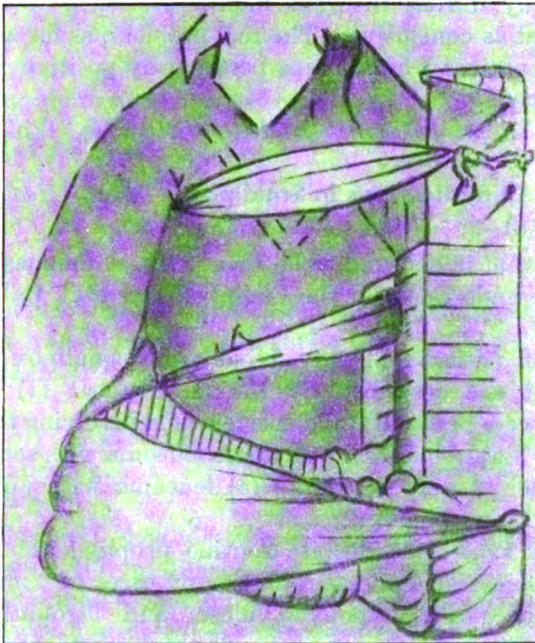


TO APPLY.

Bend out the "J" slightly and slide it up the injured arm, short limb medially and long limb laterally, leaving about 1 in. to 2 in. clearance below the elbow. Rest the forearm in the mid-prone position against the adjoining forward side of the triangle with the fingers curving round the anterior angle. Bandage the whole length of the upper arm against the outer limb with a roller bandage and then bring the concave side of the triangle into position across the front of the body. Tie the short limb of the "J" to the body with a triangular bandage round the chest. Bind the forearm firmly against the

triangle with a roller bandage. This helps to maintain a certain degree of extension on the upper arm. Tie a second triangular bandage right round the body, forearm and triangular portion of the splint. Tie a third triangular bandage round the top of the long limb of the "J" and the chest, passing beneath the opposite axilla. This, when pulled tight, produces a slight outward bowing of the middle portion of the long limb of the "J" and thereby tends to correct any medial displacement of the bone fragments, without impeding circulation as a medially placed pad may do.

If it is desired to produce additional firmness of extension in a stretcher case during a long ambulance journey a fourth triangular bandage can be tied to the bottom of the "J" passed under the crutch and brought upwards and tied to the anterior angle of the triangle.



Current Literature.

BERMAN, B. B. & SPITZ, S. H. **Treatment of Diphtheria Carriers with Penicillin.** *Bull. U.S. Army Med. Dept.* 1945, July, v. 4, No. 1, 87-91, 2 figs.

Ten proved diphtheria carriers were treated with nasal instillations of 500 Oxford units of penicillin contained in 1 c.c. of the solution. Instillation was made into both nostrils four times daily for five days, and immediately after each instillation another 1 c.c. was sprayed by an atomizer on to the fauces

and post-pharyngeal wall. Throughout the five-day course, 20,000 units were used per patient. [From this it would appear that the nasal instillation of 1 c.c. was divided between the nostrils.] All patients reverted to a non-carrier status within the period of treatment. Seven of twelve carriers employed as controls took five weeks to clear up, whilst the remaining five remained positive for two more weeks but, when treated as above with penicillin, cleared within six days. The authors believe that penicillin offers a quick and simple solution to the problem of diphtheria carriers. [It should be noted that the carriers mentioned in this experiment were admitted to hospital as cases of acute faucial diphtheria. Repeated cultures taken during the first four or five weeks of illness, if positive, led to the classification of the patients as carriers. Since in the great majority of cases of diphtheria the infecting organisms disappear from the upper respiratory tract spontaneously during the first month of illness this experiment can hardly be regarded as conclusive. The real problem, as far as hospital work is concerned, is the patient who remains persistently positive weeks or months after clinical recovery.]

A. JOE.

Reprinted from "Bulletin of Hygiene," Vol. 20, No. 11, 1945.

SEN, K. **Ocular Complications in Smallpox.** *Indian Med. Gaz.* 1945, Apr., v. 80, No. 4, 181-3.

The study of what is believed to be one of the commonest causes of blindness in India was undertaken in the Campbell Hospital, Calcutta, during the period 1932-1939.

In a group of patients already blind from smallpox the pathological conditions present are described by the author as: (1) phthisis bulbi—9 cases, of which 2 were bilateral; (2) dense leucoma involving the whole cornea—14 cases, of which 3 were bilateral; (3) dense leucoma with secondary glaucoma—6 cases, of which 2 were bilateral; (4) leucoma with anterior synechia—6 cases, of which 2 were bilateral.

In the period 1933-1935 despite routine prophylactic treatment (1 per cent methylene blue and liquid paraffin) many cases of "muco-purulent conjunctivitis, corneal ulcer, hypopyon ulcer, and lagophthalmic keratitis" were seen. The commonest organisms cultured were staphylococci, Koch-Week's bacilli, and diphtheroids.

As it seemed clear that corneal ulceration was the most potent cause of blindness, and as in every case of hypopyon ulcer where full examination was possible the lachrymal sac was seen to be infected, a routine treatment was instituted from the end of 1935 which aimed at isolating infected sacs and the control of acute conjunctivitis and lagophthalmic keratitis. This routine comprised: (1) carbolization of all suspect sacs; (2) irrigation with 1 in 15,000 mercury oxycyanide solution; (3) argyrol drops, 4 per cent or 10 per cent according to the severity of the conjunctivitis; (4) boric ointment to the lids.

During the months January to May, 1936, of 1,929 patients admitted 236 had ocular complications: of these, 51 developed these conditions in hospital

despite the preventive measures. The highest incidence occurred in March and April. The nature of these ocular complications is indicated in Table III. Cases in Group I were caused by "smallpox": those in Group II by "complications", which are defined as lesions caused either by secondary infection or by keratomalacia, and therefore preventable possibly by one of the sulphonamides, which were not available to the author, and by vitamin A.

TABLE III.—OCULAR COMPLICATIONS OF SMALLPOX.

					Total number of cases	Percentage
GROUP I.						
Conjunctival vesicles and pustules	..	..	..	..	20	8.4
Corneal vesicles and pustules	..	..	..	..	7	2.5
Sclero-corneal vesicles and pustules	..	..	..	..	12	5
Sub-conjunctival haemorrhage	..	..	..	..	9	3.8
					—19.7	
GROUP II.						
Acute conjunctivitis	...	..	..	..	27	11.4
Muco-purulent conjunctivitis	..	..	..	..	97	41.1
Muco-purulent conjunctivitis with corneal ulcer	..	..	..	..	20	8.4
Phlyctenular keratitis	..	..	..	..	10	4.2
Lagophthalmic keratitis (exposure keratitis)	..	..	..	..	28	11.8
Perforation of cornea, iris prolapse	..	..	..	..	3	1.2
Acute keratomalacia	..	..	..	..	3	1.2
					—79.3	
					236	99.0

It is noteworthy that, in contrast with previous experience, no case of hypopyon ulcer was encountered in this series. J. PICKFORD MARSDEN.

Reprinted from "Bulletin of Hygiene," Vol. 20, No. 11, 1945.

LANCET. 1945, July 28, 116–19. [55 refs.] **Role of Syringes in the Transmission of Jaundice.** A Memorandum by Medical Officers of the Ministry of Health.

In 1937, Findlay and MacCallum and MacNalty reported the occurrence of hepatitis following the administration of yellow fever vaccine containing supposedly normal human serum and measles convalescent serum, respectively. During the recent war, the intensive and extensive use of human blood products has been accompanied by several incidents of the same nature, which all give weight to the theory—gradually becoming accepted—that certain apparently normal human beings carry an icterogenic agent in their blood.

The hepatitis which may follow the introduction of this agent by various routes is very similar to that seen occasionally following arsenotherapy, and to the condition in epidemic, endemic or sporadic cases of infective hepatitis. Considerable attention has been focused on this problem, and on similar types of cases that have been described as occurring in diabetic and arthritic clinics. This memorandum records the present available knowledge on the subject, collected as a result of reviewing published and some unpublished reports of incidents.

The factor common to all these incidents, whether in venereal disease,

diabetic or arthritis clinics, was multiple venepuncture or subcutaneous injections. Various workers suggested that the fault lay in the inadequate sterilization of the syringes used for these procedures together with the fact that the icterogenic agent mentioned above was present in some of the patients attending the clinics. Mere rinsing of syringes does not get rid of traces of blood, and this agent is extremely resistant to heat and other inactivating agents, such as phenol and tricresol.

The presence of a transmissible icterogenic agent in the serum of cases of post-arsenotherapy hepatitis has been demonstrated by the inoculation of human volunteers; and controlled experiments have shown that this type of hepatitis, as it occurs in arsenotherapy clinics, can be eliminated by inactivation of this agent by means of adequate dry heat sterilization of all needles and syringes.

The question whether or not an identical icterogenic agent is at work in all instances has yet to be settled, but there is ample evidence that the same preventive measures will apply to the eradication of all types of this so-called syringe-transmitted hepatitis.

A Committee of the Medical Research Council has recently published a most timely memorandum on the adequate sterilization of syringes, which should be extremely useful for hospitals and practitioners alike (*M.R.C. War Memo. No. 15, H.M. Stationery Office, 1945*; see this *Bulletin*, 1945, v. 20, 632).

F. O. MACCALLUM.

[Graham (*Lancet*, 1945, Sept. 1) refers to the mention, in the Ministry of Health memorandum, of cases of jaundice in his diabetic clinic between 1936 and 1938; in these cases each patient had his own syringe so transfer of infection by the syringe could be excluded, but the technique for taking blood for blood-sugar estimation was examined. Blood was taken by pricking the finger with a Sahli blood gun after cleaning the finger with ether, and the gun was wiped with a swab soaked in ether. It was decided to immerse the gun in 5 c.c. of ether after each prick besides wiping it; the incidence of jaundice ceased after this, only one case appearing (2 months ago) in the last five years. The evidence suggested that the infection was conveyed by the needle but, in view of what is said in the memorandum about the value of ether, the author does not conclude that the disappearance of the infection was due to this change in technique, and suggests that it might be better to stand the needle in alcohol and clean the finger with alcohol, followed by ether to dry it, or to sterilize the needle in boiling oil at 130° C.—EDITOR.]

Reprinted from "*Bulletin of Hygiene*," Vol. 20, No. 11, 1945.

DARMADY, E. M. & HARDWICK, C. **Syringe-transmitted Hepatitis.** *Lancet*. 1945, July 28, 106-7.

The authors have had 182 cases of hepatitis in airmen under their care during the winter of 1944-45. There was reasonable epidemiological evidence that the majority of these men were suffering from naturally-occurring infective hepatitis, but in 34 the authors considered that there was strong evidence

that an icterogenic agent had been introduced during the course of some type of inoculation.

There were seven men who developed hepatitis within 200 days of arsenotherapy, and 15 cases following transfusion. In addition to these two types of transmission of hepatitis, which have been described frequently in recent years, there was evidence that an icterogenic agent had been injected into 12 other men during several other procedures.

Six patients had undergone surgical operation 31 to 151 days previously. These patients had all received intravenous "Pentothal sodium" as an anæsthetic, and the suggestion is made that an icterogenic agent was introduced from the syringe which had not been sterilized satisfactorily. The cases listed above as following transfusion also had had "Pentothal" injections, so unless the same batch of transfusion serum or plasma was used for all the patients it would be difficult to detect the causative factor.

Four patients developed hepatitis 64 to 113 days after intramuscular injection of penicillin, and two after repeated venepunctures.

This article draws attention once more to the need for care and attention to proper sterilization of syringes and needles in clinics and hospitals where large numbers of injections and bleedings are performed. F. O. MACCALLUM.

Reprinted from "Bulletin of Hygiene," Vol. 20, No. 11, 1945.

Reviews.

ILLUSTRATIONS OF REGIONAL ANATOMY. Sixth Edition, complete in one volume. By E. B. Jamieson, M.D. Edinburgh: E. and S. Livingstone. Pp. xii + 320. Price 75 shillings.

This book contains 320 pages of coloured illustrations of Regional Anatomy, embodying 361 actual illustrations. It is divided into 7 Sections illustrating respectively the Central Nervous System, The Head and Neck, The Abdomen, The Pelvis, The Thorax, The Upper Limb and the Lower Limb, and these Sections may be had separately if desired.

The work had its origin in Dr. Jamieson's blackboard diagrams illustrating his lectures in Edinburgh for many years, and the illustrations chosen in the book bear witness to his long experience in teaching students. The colours show the diagrams off well, the pointers are accurately placed, and there is a complete Index by which structures can be traced in different illustrations. The author, publishers and printers are entitled to take great credit for this fine production coming from a famous school of anatomy.

We recommend this book very confidently to Military Hospital Library Committees and to Service Medical Officers generally. D. C. B.

SYMPOSIUM ON NEUROPSYCHIATRIC DISEASES. Reprinted by the United States Office of War Information from *The Medical Clinics of North America* for January, 1945. W. B. Saunders Company, Philadelphia and London.

This collection of reviews and case-studies is one of a series of symposia on subjects of recent or topical interest. The writers are drawn from the teaching staffs of Chicago and Philadelphia hospitals and the articles vary from accounts of case demonstrations to reviews which present the results of recent advances in treatment. Little original or controversial matter is included and the result is a stimulating and readable book with no pretensions to completeness or profundity which will be welcome to physicians whose clinical contacts have been limited by war work. Useful reviews are included on peripheral nerve injuries, protrusion of the intervertebral disc, treatment of myasthenia gravis, benign lymphocytic choriomeningitis and acute encephalo-myelo-radiculoneuritis. Two articles on facial pain and on chordotomy review with clarity the present position of surgery in the relief of some forms of intractable pain. In a well-illustrated article Loyal Davis gives some of the results of his long experience of peripheral nerve injuries and refers briefly to the uniformly good results being obtained in causalgia by interruption of the sympathetic innervation of the affected region. When the difficulties which until so recently attended the treatment of this condition are recalled it is felt that more details would have been welcome.

In the field of psychiatric disorders there is a clear account of the practical points to be considered in the use of electro-shock in the out-patient departments of general hospitals. A thoughtful article by Meduna and McCulloch on changes in the modern concept of schizophrenia is purely for the psychiatrist and, unlike the rest of the series, of little interest to the general physician. The term "neuropsychiatric diseases" might have afforded an opportunity for discussion of both neurological and psychiatric aspects of the subjects under review, but on the whole, with the exception of some case studies by Sloan, each specialist has kept to his own aspect of the case.

A general trend in a number of the articles is to recommend the non-specific use of large doses of vitamins in a variety of conditions and, in fact, to occupy the patient's time and metabolism with treatment even if there are few specific indications.

A BIBLIOGRAPHY OF VISUAL LITERATURE, 1939-1944. Compiled by J. F. Fulton, Phebe M. Hoff, and Henrietta T. Perkins. Washington: Prepared by the Committee on Aviation Medicine, Division of Medical Sciences, National Research Council, 1945. Pp. x + 117. Price \$3.00.

A bibliography of visual literature, 1939-1944, compiled by J. F. Fulton, P. M. Hoff, and H. T. Perkins, is a useful and welcome addition to the bibliographical lists in ophthalmology. Previously there had been no publication in the English language to take the place of the German *Zentralblatt für Ophthalmologie*, and the need of such a source during the late war in which visual problems attained such widespread military importance led the British Air Ministry to request assistance of the United States Office of Scientific Research and Development in Washington, and of Yale University, in the compilation of a classified bibliography covering all literature on vision that might have relevance in military operations. The work under review is the result and, although by no means a complete index to the ophthalmic literature during the war years, in its special field it should be of great value to the research worker and also to the Service ophthalmologist. It is issued as Publication No. 11 of the Historical Library, Yale Medical Library, and distributed by Charles C. Thomas, of 301-327, East Lawrence Avenue, Springfield, Illinois, U.S.A., at the price of three dollars.

THE PRINCIPLES AND PRACTICE OF RECTAL SURGERY. Third edition. By William B. Gabriel, M.S., F.R.C.S. London: H. K. Lewis & Co., Ltd. 1945. Pp. lx + 432. Price 45s. net.

The first edition of this work was cordially received in 1932; seven years have passed since the last edition was issued. In these seven years, thinks the author, there has been not only a considerable increase in the knowledge of rectal diseases but also a much greater interest in rectal surgery. There can be little doubt of the truth of these assertions.

The work is entirely comprehensive. While the author expresses his own individuality he has not failed to draw upon the views and experience both of his colleagues at St. Mark's Hospital and of workers elsewhere. The anatomy of the ano-rectal region, to which much attention has recently been directed, is fully dealt with and embellished with excellent diagrams. A new chapter on proctitis has been added.

The section on carcinoma of the rectum occupies nearly one-quarter of the volume; in treatment the author very clearly reviews the various operative alternatives possible.

Little can be commented upon in a work which is so complete and so well accepted. Some new illustrations have been added to a volume which was already well illustrated, and these include quite a proportion of beautiful coloured plates. The illustrations depicting operative procedures are particularly clear and helpful. This is a book which no one at all interested in rectal surgery can afford to be without; it is altogether admirable.

KETTLE'S PATHOLOGY OF TUMOURS. Third Edition. Revised by W. G. Barnard, F.R.C.P., and A. H. T. Robb-Smith, M.A.Oxon., M.D.Lond. London: H. K. Lewis & Co., Ltd. 1945. Pp. viii + 318. Illustrations 191. Price 21s. net.

All our officers who studied pathology as a special subject at the R.A.M. College before the war are familiar with Kettle's Pathology of Tumours. They will be interested to learn that a new edition has now appeared and will be glad to know that, although Kettle is no longer with us, his book lives to maintain the traditions of a great teacher.

As is well known, the purpose of this book is to provide a manual for students free from a mass of detail but at the same time embodying those facts generally accepted in the teaching of pathology. In such a complex subject as the pathology of tumours it is by no means an easy task to simplify the topic. But Kettle had this gift and in his writings imparted his knowledge in a free and easy style. Although many changes have been made in the new edition the present authors have been successful in maintaining the style so characteristic of the original author.

During the intervening years since the appearance of the second edition many advances have been made in our knowledge of the pathology of tumours and it is fitting that a third edition should now be published.

When the R.A.M. College again assumes its role as the centre of medical instruction in the Army the new edition of this excellent manual will play its part in the teaching of pathology for, as in the past, this book can thoroughly be recommended.

MANUAL OF CLINICAL MYCOLOGY (Military Medical Manuals, National Research Council of U.S.A.). Philadelphia and London: W. B. Saunders Company. 1945. Pp. 348, including an appendix of mycological methods, formulae for treatment, and an index.

Few of us know much about moulds or the infections they cause. The necessary information is all here, beautifully set out—as all these manuals are. The book can be commended without reserve.

THE CONTROL OF COMMUNICABLE DISEASES. A Manual of the American Public Health Association. Published by the Office of War Information. Fifth Review, 1945.

Condensed notes on the methods of control of 71 infectious diseases are given in about 150 pages, suitable for quick reference and fully indexed. The booklet has the approval of the United States Public Health Service, and is convenient to carry, measuring 8 by 4½ inches. After reference to this booklet, any medical officer faced with an outbreak of communicable disease could be satisfied that he had omitted none of the usual measures of control. The text was agreed with the medical staff of the Ministry of Health in the case of certain diseases which may occur in the United Kingdom, but it is a little surprising to find cholera, yellow fever and plague included in these, while food-poisoning, scabies, common cold, impetigo and pneumonia are not. Although based primarily on the United States, infectious diseases occurring in any part of the world are generally included.

The booklet is an authoritative and comprehensive summary of present-day preventive measures adopted for individual infectious diseases, which, together with its small bulk, recommends it for inclusion among the few books one can carry in the field.

MEDICAL JURISPRUDENCE AND TOXICOLOGY. Eighth Edition. By John Glaister, J.P., D.Sc., M.D., F.R.S.Ed. Edinburgh: E. & S. Livingstone, Ltd. Pp. 691. Price 30s. net. Postage 8d. home.

Glaister's book needs no introduction to our readers who will be interested to learn that the eighth edition has now appeared. Since it was last reviewed in these columns the text has undergone many changes and a number of additional illustrations have been included. The author states he had to overcome many difficulties in publishing this edition during the war: but we have no hesitation in saying that his efforts have been well rewarded, for his book has been extremely well reproduced.

Forensic medicine is a subject that fascinates the student, consequently the teacher never needs to worry lest he lectures to vacant benches. His subject is too engrossingly interesting. But in the days of stern practice that follow academic life medico-legal problems occur infrequently and points of detail that were so vivid in the mind of the undergraduate are apt to recede. In addition, medico-legal problems have the habit of presenting themselves suddenly and vary enormously in character. For these reasons it is sound policy for every practitioner to have ready at hand a book on medical jurisprudence and toxicology to which he can refer: one that will give him up-to-date facts clearly expressed and quickly available. Here we have such a volume.

In the latest edition the author has shown a wise choice in the additional material he has included. Special mention might be made of the inclusion of the Cremation Procedure in England and Scotland, a subject to which reference requires frequently to be made; also such conditions as crush injuries and the effects of blast, of which we have acquired fresh knowledge during the war.

In the section on toxicology all the poisons likely to be met with receive attention. The recently introduced insecticides and insect repellents are, however, not yet included. But perhaps this is hardly to be expected since they have been used so far only by the armed forces. No doubt they will be mentioned in the next edition by which time experience will have been gained of their employment in the hands of all and sundry.

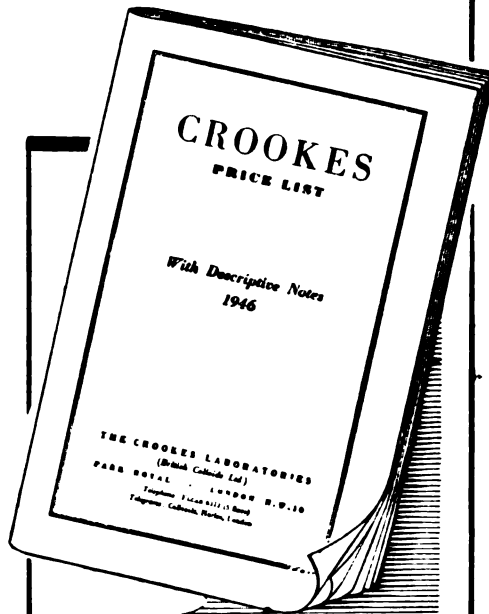
In general this is a most useful book and the significance of it having reached its eighth edition requires no comment. It can be recommended for the library of every military hospital and certainly will be a valuable acquisition to the armamentarium of all Army pathologists.



"The Golden Bough"

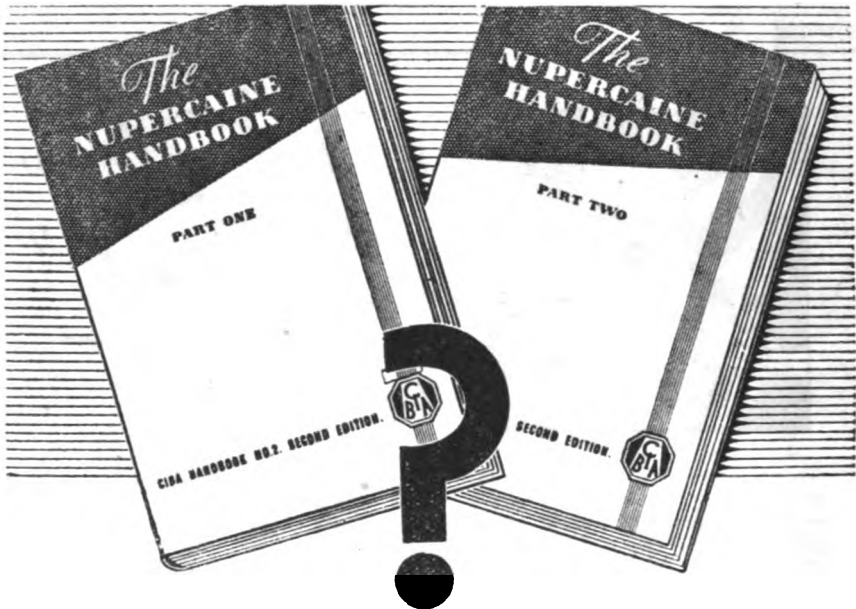
The mistletoe, or golden bough, symbol of goodwill, was once accepted as a pure gift from the gods for its presumed mystical and medicinal properties.

IN extending the most cordial greetings and best wishes for 1946 to their many friends in the medical profession, Crookes take this opportunity of introducing their new descriptive price list; and it is hoped that the new style of layout will be found a convenience.



Crookes price list is available upon request.

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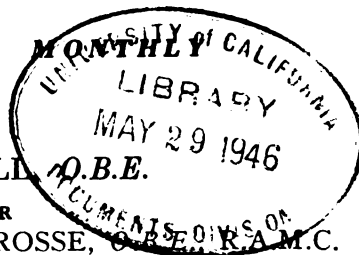
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Original Communications.

TYPHUS FEVER IN IRAN AND IRAQ, 1942-43 A REPORT ON 2,859 CASES.

BY

Colonel A. SACHS, M.D., M.Sc.

Late Assistant Director of Pathology, Persia-Iraq Force

(Continued from p. 11)

PART II.

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 - (1) Morbid Anatomy.
 - (2) Morbid Histology.
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(D) PATHOLOGICAL ASPECTS.

(1) Morbid Anatomy.

POST-MORTEM examinations were carried out on nearly all fatal military cases, but were not permissible on Iranian civilians.

The post-mortem changes are indeterminate and it is not possible to make a diagnosis on the macroscopic appearances alone. Findings vary with the duration of disease prior to

death, i.e. whether the patient died during the pyrexial period or convalescence. In the former the changes are those associated with acute toxæmia. There are, however, certain findings which may suggest a diagnosis of typhus fever in the presence of an epidemic.

The lungs are hæmorrhagic, œdematous and exude a blood-stained frothy fluid. Varying degrees of collapse or consolidation may be found. The air passages are congested and pink in colour. Hæmorrhagic patches are sometimes present in the walls of the trachea and bronchi.

It would appear that there is a particular liability to hæmorrhages. Petechial and larger hæmorrhages occur, not only in the skin but in different organs, and are also found below the serous membranes. Subserous hæmorrhages into the wall of the cæcum and subepicardial hæmorrhages are fairly constant findings.

Acute abdominal symptoms were present in three out of a series of 60 cases. 2 of these were operated on—one for acute appendicitis two weeks prior to his death; the other survived the exploratory operation. In the fatal case no evidence of healing of the wound was found either macroscopically or microscopically. The findings in two fatal cases with symptoms of "acute abdomen" were not unlike those associated with Henoch's purpura. Both had massive subepicardial hæmorrhages and hæmorrhages into the wall of the cæcum.

In some cases, particularly dark-skinned individuals, the rash appeared more obvious after death.

When death has occurred during convalescence, the findings are those usually associated with cardiac failure—the heart muscle being thin and flabby.

(2) *Morbid Histology.*

The histological changes found are described in some detail, as only scanty information is given in the standard textbooks of pathology consulted, and some new material is included.

The microscopic changes are more definite than the macroscopic, but even these are liable to variation in different cases. It would appear that this apparent variation does in reality represent progressive stages in the disease. The description which is given is based on the study of sections stained with hæmatoxylin and eosin and Giemsa's stain after either formalin or Zenker's fixation.

As emphasized by different workers, and by Wolbach *et al.* (1922) in particular, the essential and characteristic change found microscopically in typhus fever is a proliferative lesion of the endothelium of the blood-vessels. This observation has been confirmed in Iran and Iraq by histological examinations made from cases dying on various days of the disease.

(a) *Vascular Changes* (see Plate I, figs. 1, 2 and 4).—The characteristic vascular changes are best seen in the small blood-vessels of the mid-brain, particularly in the region of the upper pons, but they may equally readily be studied in the skin, heart, kidney or other organs.

The primary change is a proliferation of the endothelial cells lining the vessels. This proliferation may affect the whole circumference of the vessel or be a small papilliform outgrowth of endothelial cells into the lumen. Associated with the proliferation is a swelling of the endothelial cells around the lumen, each cell becoming rounded and hyperplastic instead of having the normal flattened shape. In some vessels the lumen is almost completely obliterated by a uniform proliferation of the endothelial cells and in the finest capillaries occlusion is complete. This partial blocking combined with the disturbance of the endothelial cells results in thrombosis which leads to complete occlusion of the vessel. If the lumen is incompletely thrombosed, the hyperplastic endothelial cells sometimes appear to be covered with a fibrinous exudate which prevents contact with the circulating blood. These findings are characteristic of the vascular changes found in cases dying early in the disease.

Should the patient survive into the second and third weeks before death, characteristic nodules described by Wolbach *et al.* (1922) are found in the brain, heart and kidneys. The nodules when examined under the high power are found to consist of perivascular accumulations of mononuclear and occasionally polymorphonuclear cells. It is believed that the mononuclear cells are chiefly derived from the adventitia and periadventitial elements. As far as can be ascertained these nodules do not appear until after the vascular changes described

above have occurred. The typical Wolbach nodules are tubercle-like collections of cells surrounding an apparently necrotic centre, but which is in reality the lumen of an occluded vessel. They stain rather more intensely than the surrounding tissue.

(b) *The Central Nervous System* (see Plates I and II, figs. 3, 4, 6 and 8).—The cerebral cortex, hypothalamus, thalamus, pons, medulla and the cerebellum have been examined and show the typical vascular changes. Thrombosis occurs very frequently in the smaller arteries and capillaries.

In addition to the typical Wolbach nodules found scattered throughout the brain and associated with the vascular lesion, other nodules have been seen which, by means of serial sections, have been shown to have no apparent connexion with the vascular system. One possible explanation is that some may represent minute areas of ischæmic necrosis and are probably collections of neuroglial or microglial cells.

It is well known that collections of mononuclear cells in the brain substance are not peculiar to typhus fever, but may be found in any type of encephalitis due to virus and some spirochætal infections. In these diseases the usual vascular change is perivascular cuffing with lymphocytes and plasma cells but without occlusion of the vessels by endothelial hyperplasia.

Another change noted is degeneration of the neuron cells. This is shown by chromatolysis, loss of nuclear structure and rounding off of the cell contour.

It is interesting to note that in some cases dying late in the disease the only change found is the presence of the nodules. The vascular endothelium appears to have recovered from the hyperplasia and the cells have resumed their normal flattened shape.

(c) *Heart* (see Plate I, figs. 1 and 2).—Generally there is a diffuse well-marked infiltration by mononuclear cells between the muscle fibres of the myocardium. Small areas of necrosis have been observed, and varying degrees of toxic changes are also present in the muscle fibres.

But the most characteristic finding is the appearance of nodules between the muscle bundles. These at first sight under the low power appear to resemble Aschoff nodes. On examination with the high power, these are seen to be typical perivascular collections of cells and form part of the general infiltration of the whole musculature.

(d) *Lungs* (see Plate II, fig. 9).—The earliest change found is œdema and congestion of the alveolar walls. Varying degrees of pneumonitis and bronchopneumonia are always present. An infiltration of the alveolar walls with the same type of mononuclear cells found in other organs is present, but there does not appear to be the same degree of endothelial proliferation or obstruction to the blood flow which is found elsewhere. Thrombosis is sometimes present in many of the smaller arterioles and in the perialveolar capillaries.

(e) *Liver* (see Plate II, fig. 10).—The findings have by no means been constant. The portal canals have a marked cellular infiltration and their arterioles show signs of endothelial hyperplasia, but typical nodules have not been observed. Generally the liver cells show some degeneration, but surprisingly little in view of the vascular changes. Focal necrosis mainly in relation to the central vessels has been observed.

Hyaline material has been seen in the sinusoids. But, when present, the most striking finding is the reaction of the Kupffer cells. These are swollen and lie free in the sinusoids. Occasionally they are in mitosis and sometimes contain debris or cells.

(f) *Kidneys* (see Plate I, figs. 5 and 7).—Glomeruli: The earliest change observed is proliferation of the endothelial cells of the afferent vessels to the glomeruli. This proliferation then appears to extend into the tufts which show a marked cellular hyperplasia. In the later stages the glomerular capillaries contain hyaline material which is suggestive of intraglomerular thrombosis.

Perivascular accumulations of mononuclear cells and some polymorphonuclear leucocytes are generally related to the glomerular vessels.

Tubules: There is much destruction of the cells of the convoluted tubules, in many of which the lumen contains an acidophilic-staining fibrinous exudate and desquamated tubule cells. Perivascular collections of cells are related to the intertubular capillaries and are most

numerous in the medulla. The intertubular blood-vessels are obliterated by endothelial proliferation. Mononuclear cells then appear to migrate and, in addition to the perivascular accumulations, invade one or several tubules surrounding the vessels, giving rise to fairly large collections of cells which stain more intensely than the surrounding tissues.

(g) *The Skin*.—Lesions in the skin are present early in the disease. The capillaries show marked endothelial proliferation and perivascular collections of mononuclear cells. Thromboses are present.

In the other organs and the endocrine system, some degree of vascular proliferation similar to that already described and the changes associated with toxæmia are present. Some cases show the maximum changes in the internal organs like the spleen and heart, with the presence of only slight changes in the brain-stem. But in the majority of these cases changes in the pontine region predominate. Another feature well shown in the cases that have been collected is that the histological changes precede the existence of a positive Weil-Felix reaction.

(3) *Demonstration of Rickettsiæ in Human Tissues*

(see Plates II and III, figs. 11, 12, 13 and 14).

Gram's, Macchiavello's, Castanedo's, Giemsa's and Leishman's stain were tried in Paiforce. The most successful results were obtained with Giemsa. Since then I have had the opportunity of examining the same material and have obtained satisfactory results by using a slight modification of Wolbach's (1922) technique for Giemsa stain.

Details of the technique used are as follows :

(1) It is essential for tissues to be fixed in Zenker's fluid for twenty-four hours. Should tissues be embedded without prior fixation in Zenker's fluid, cut sections should be post-fixed for an hour in this fluid. It is also important to wash the section in ether prior to staining.

(2) Sections 4 μ in thickness are cut from tissues embedded in paraffin.

(3) Xylol \rightarrow Ether \rightarrow Alcohol (various dilutions).

(4) The corrosive sublimate is removed by washing with Gram's iodine for five minutes, after which the section is washed with 0.5% sodium thiosulphate for ten to fifteen minutes to remove the iodine.

(5) Sections are washed well in running water for ten minutes, followed by further washing in distilled water.

(6) Stain for twelve to eighteen hours in alkaline Giemsa solution prepared as detailed below :

Distilled water	..	..	..	..	..	..	100 c.c.
0.5% soda bicarbonate	..	..	..	..	..	..	2 to 4 drops.
Methyl alcohol	..	..	..	..	..	..	3 c.c.
Giemsa stain	..	..	..	..	..	..	2.5 c.c.

(7) Differentiate in acetone, controlling under the microscope.

(8) Dehydrate, clear, and mount in cedarwood oil.

Using this technique the globular masses of rickettsiæ stain a purplish colour, and can be differentiated from the acidophilic and basophilic-staining granules present in leucocytes of the granulocyte series.

Rickettsial smears made from the vaccine and infected yolk sac of developing chick embryos obtained from Van Rooyen have been used as controls. Globular masses of coccoid bodies morphologically resembling rickettsiæ have been demonstrated in the swollen endothelial cells of the smaller blood-vessels of the kidney, liver, brain, heart, alveolar walls of the lungs, and in skin clips.

Pairs or short chains and occasionally bipolar-staining organisms were also present.

In addition to rickettsiæ, blue-staining inclusion bodies in cells have sometimes been seen in the endothelial cells of blood-vessels in human cases. Their significance is not known.

The importance of control fixation and staining of normal tissues has been very evident, as organisms found in the brain and other organs examined from patients dying of quite different diseases may be mistaken for rickettsiæ.

PLATE I.—HUMAN MORBID HISTOLOGY.

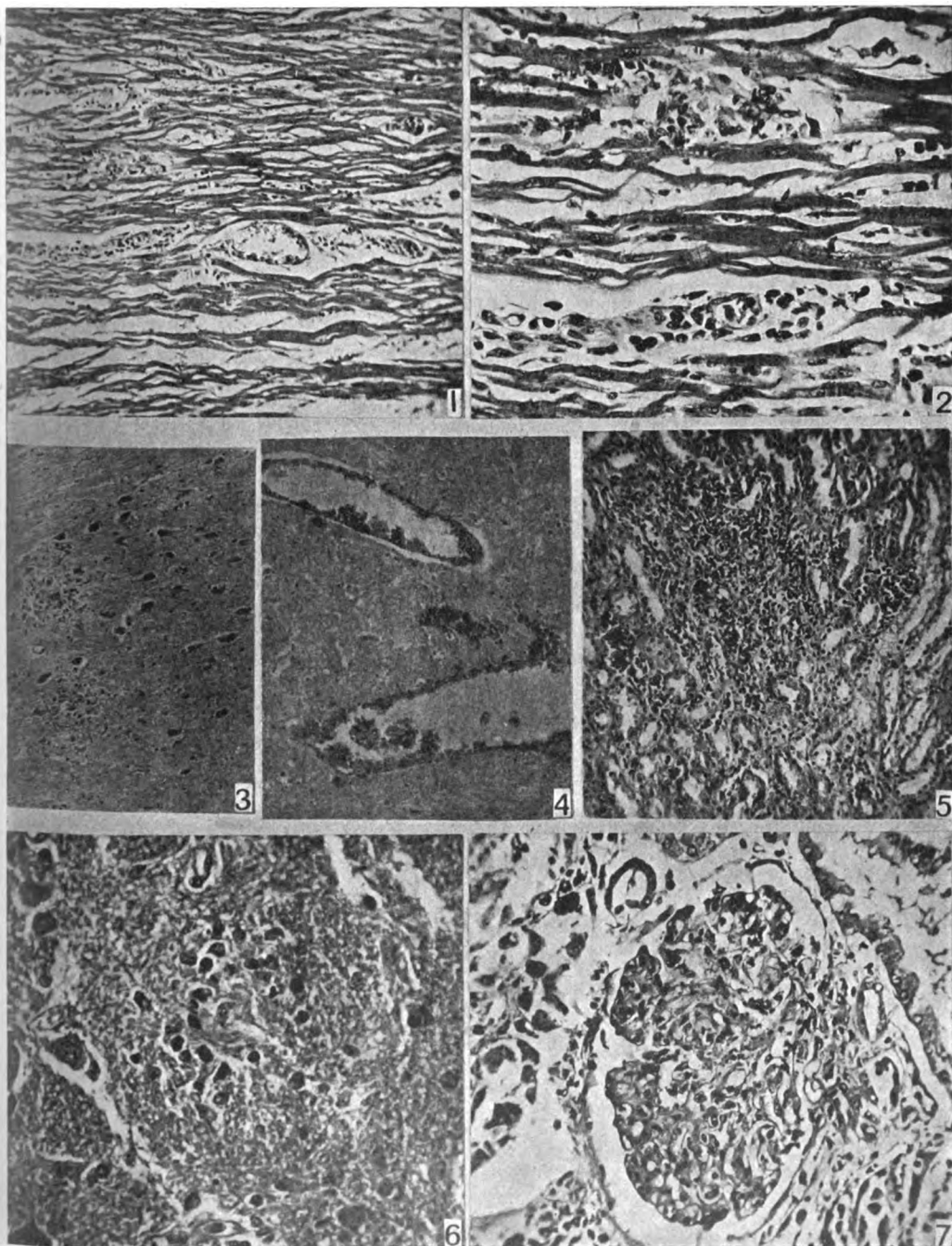
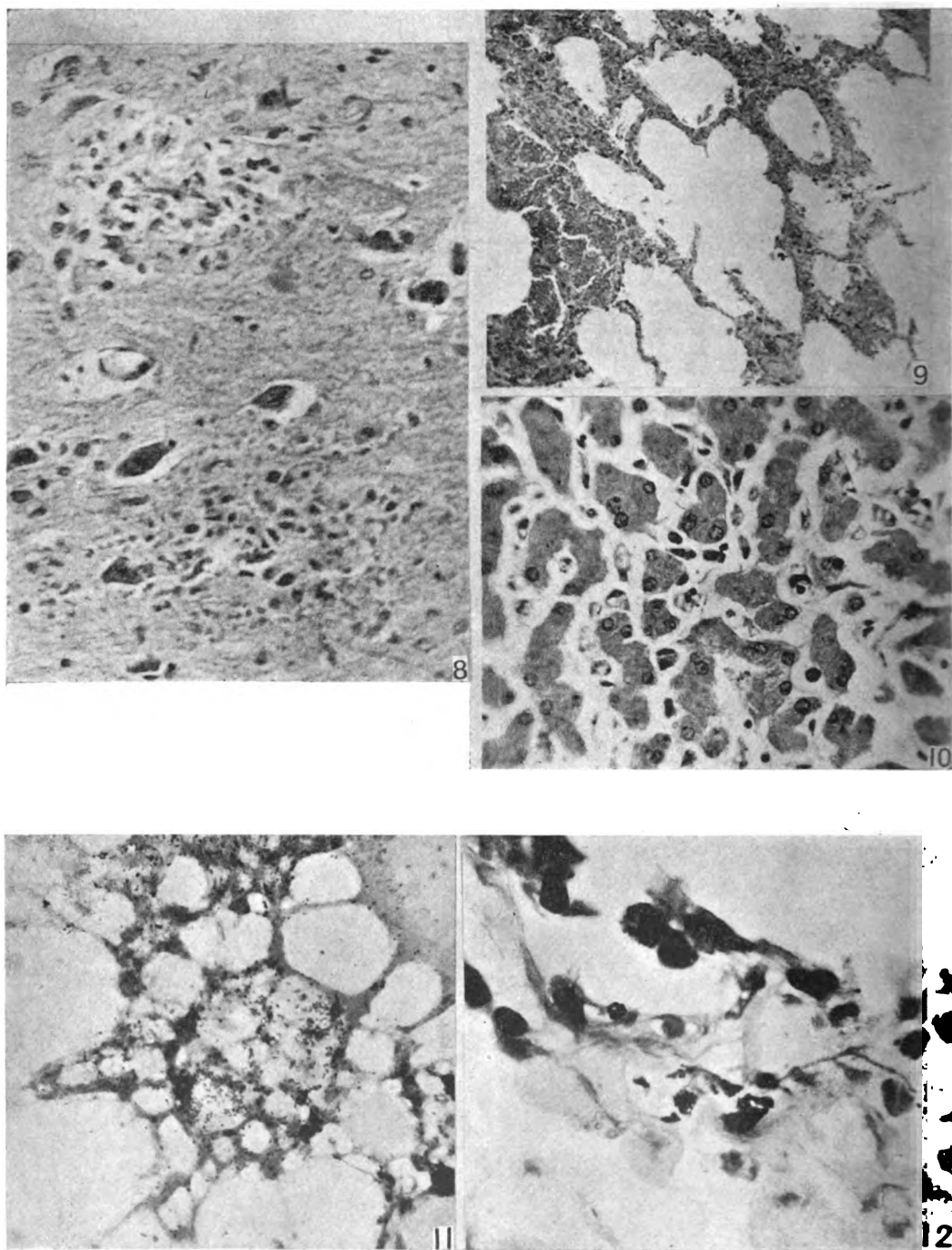
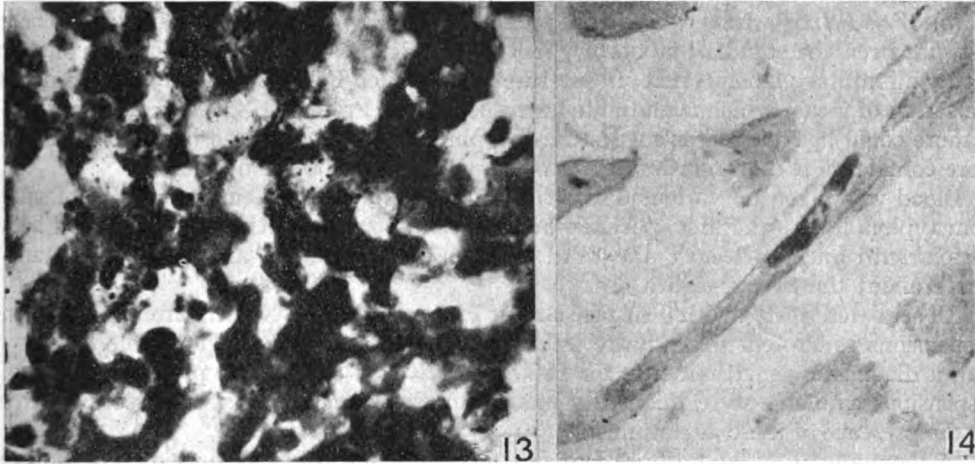


PLATE II.



RICKETTSIAE IN HUMAN TISSUES AND CULTURE

PLATE III.



NOTES, CLINICAL AND HISTOLOGICAL, ON ILLUSTRATIONS

PLATE I.

FIG. 1.—*Myocardium*. Death tenth day. Shows a diffuse infiltration by mononuclear cells between muscle fibres. There is a small necrotic area above a typhus nodule which resembles an Aschoff nodule under the low power. $\times 100$ diameters.

FIG. 2.—*Myocardium*. High-power photomicrograph of the lesions in fig. 1. $\times 275$ diameters.

FIG. 3.—*Pons*. Shows the presence of two collections of mononuclear cells which form the characteristic nodules described by Wolbach. $\times 60$ diameters.

FIG. 4.—*Pons*. Two blood-vessels are present which show marked endothelial proliferation with papilliform ingrowths of cells into the lumen of the vessels. $\times 60$ diameters.

FIG. 5.—*Kidney*. Shows vascular proliferation, which is related to the intertubular blood-vessels. Mononuclear cells appear to have migrated and invaded several tubules forming a large cellular nodule. The cells lining the tubules show degenerative changes. $\times 60$ diameters.

FIG. 6.—*Pons*. Death tenth day. Shows an early nodule of the type described by Wolbach. $\times 400$ diameters.

FIG. 7.—*Kidney*. Death tenth day. Some hyalinization is present, suggesting intraglomerular thrombosis. Lining cells of Bowman's capsule appear to be desquamating. Approximately $\times 250$ diameters.

PLATE II.

FIG. 8.—*Pons*. High-power photomicrograph of fig. 3. Approximately $\times 220$ diameters.

FIG. 9.—*Lung*. Death tenth day. Shows the presence of oedema and cellular infiltration of the alveolar walls. Signs of early bronchopneumonia are seen on the left. $\times 110$ diameters.

FIG. 10.—*Liver*. Death tenth day. Kupffer cells are swollen and lie free in sinusoids. One near the top of the field is in mitosis. Another in the centre contains cells. $\times 400$ diameters.

FIG. 11.—Photomicrograph of a Giemsa-stained smear made from a developing chick embryo yolk sac inoculated with the Addis Ababa strain of *Rickettsia prowazekii*. Specimen supplied by Major C. R. Van Rooyen. $\times 1,050$ diameters.

FIG. 12.—Photomicrograph of the alveolar wall which shows the presence of two globular masses of rickettsiae below the centre of the field. Death tenth day. $\times 1,200$ diameters (stained by Giemsa).

PLATE III.

FIG. 13.—Photomicrograph of another area in the same lung section as fig. 14, showing rickettsiae in pairs. $\times 1,200$ diameters (stained by Giemsa).

FIG. 14.—Photomicrograph of heart muscle fibre in the region of a blood-vessel shows a fusiform collection of globular masses of rickettsiae. $\times 1,050$ diameters (stained by Giemsa).

(E) LABORATORY INVESTIGATIONS.

(1) *Serological Investigations.*

(a) *Weil-Felix Reaction.*—Up to the present time the Weil-Felix reaction, still an empirical test, has been the standard laboratory method for diagnosing typhus fever and was carried out by all military laboratories. In interpreting the Weil-Felix reaction it was accepted that the serum of a case which agglutinated a suspension of *Proteus* O X19 in a dilution of 1 : 100 or more could be regarded as suggestive of typhus fever and a diagnosis could be made with more confidence if the agglutinin titre rose rapidly as the disease developed.

Blood was taken on various days of the disease from all patients suspected of suffering from typhus fever—the first specimen being taken about the fifth day, the second between the eleventh and fourteenth, the third between the eighteenth and twenty-first, and the fourth about the twenty-eighth.

All sera were tested with O suspensions of *Proteus* X19 and X2 sent from Kasauli, India. Suspensions of *Proteus* O XK were frequently found to be auto-agglutinable. As no case with a diagnostic agglutinin titre for *Proteus* O XK had been found previously, and as the suspensions available were frequently unsatisfactory, it was decided to discontinue testing for the presence of these agglutinins.

In the majority of laboratories Dreyer's technique and tubes were used. The tubes were incubated in a water bath at 50° to 52° C. for two hours and after standing at room temperature overnight the results were read.

At Teheran Felix's technique was used. Tubes were incubated at 37° C. for two hours and after standing at room temperature overnight the results were read.

Over a thousand sera were sent to Van Rooyen for confirmatory tests, and also for the rickettsial agglutination reaction.

(i) *Laboratory Findings:* The serological findings from cases diagnosed as typhus fever are analysed and tabulated below (only denominators of dilutions are given). As no significant differences were found in the percentage mortality rates or the agglutinin response in sera, British and Indian troops are considered as one group. A total of 2,424 sera were examined.

TABLE I.—DETAILS OF TITRES OBTAINED DURING DIFFERENT WEEKS OF THE ILLNESS.
FIGURES REPRESENT NUMBERS OF SERA EXAMINED WEEKLY.

A. <i>British and Indian troops.</i>									
		<i>Below</i>						<i>Above</i>	
		125	125	250	500	1,000	2,500	5,000	5,000
1st Week ..	..	50	4	7	2	3	—	—	66
2nd Week ..	..	26	14	13	12	21	6	5	98
3rd Week ..	..	4	2	6	5	5	5	1	28
4th Week ..	..	1	3	2	—	5	1	1	13
B. <i>Coolies.</i>									
		<i>Less than</i>							
		125	125	250	500	1,000		<i>Total</i>	
1st Week ..	..	36	2	5	—	—		43	
2nd Week ..	..	50	12	10	5	2		79	
3rd Week ..	..	1	3	2	2	1		9	
C. <i>Iranian Civilians.</i>									
		<i>Not present</i>	<i>Below</i>						
		160	160	320	640	1,280	2,560	5,120	<i>Total</i>
1st Week ..	..	147	144	99	71	80	20	6	567
2nd Week ..	..	72	139	122	159	142	55	12	707
3rd Week ..	..	23	78	59	84	78	26	6	357
4th Week ..	..	15	31	26	27	18	8	2	127

TABLE II.—MEAN AVERAGE WEEKLY TITRES OF SERA.

	<i>British and Indian Troops</i>		<i>Coolies</i>		<i>Iranians</i>	
	<i>Nos.</i>	<i>Mean Average</i>	<i>Nos.</i>	<i>Mean Average</i>	<i>Nos.</i>	<i>Mean Average</i>
1st Week ..	66	114	43	56	567	248
2nd Week ..	98	843	79	125	707	428
3rd Week ..	28	960	9	325	357	436
4th Week ..	13	1031	—	—	127	330

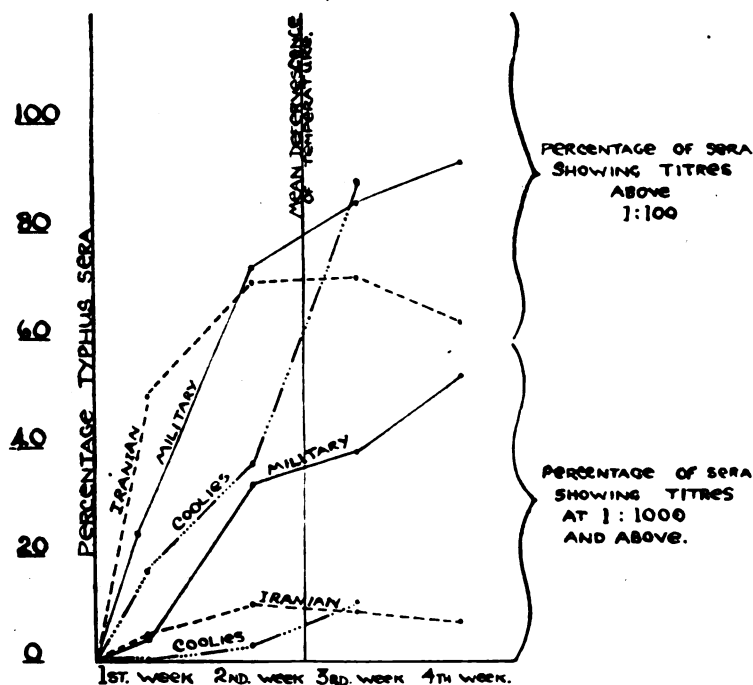
TABLE III.—FATAL CASES.

	British and Indian Troops			Totals	Coolies*
	1st Week	2nd Week	3rd Week		
No agglutination ..	2	7	1	10	16
Below 125 ..	2	2	—	4	11
At 125 ..	—	—	1	1	4
250–1,000 ..	1	4	2	7	7
Over 1,000 ..	—	5	1	6	—
Totals ..	5	18	5	28	38

*As definite dates could not always be obtained, the results have been consolidated.

(ii) Analysis of Laboratory Findings: Other diseases were prevalent at the same time as typhus fever. Cases of typhoid, relapsing fever, measles and hæmorrhagic smallpox also had an exanthematous eruption. The symptoms in others like sandfly fever and various respiratory infections resembled those of the early stages of mild cases of typhus fever. As far as possible no case was diagnosed typhus fever unless the cases were clinically typhus fever irrespective of the serological findings or mild and atypical cases showing a diagnostic rising titre. It is therefore probable that some mild or abortive cases producing Felix's (1944) low titre curve were not diagnosed typhus fever. This controlled diagnosis was necessary to prevent numerous non-typhus fever cases being diagnosed as such.

The agglutinin titres obtained are illustrated in the two graphs which follow:



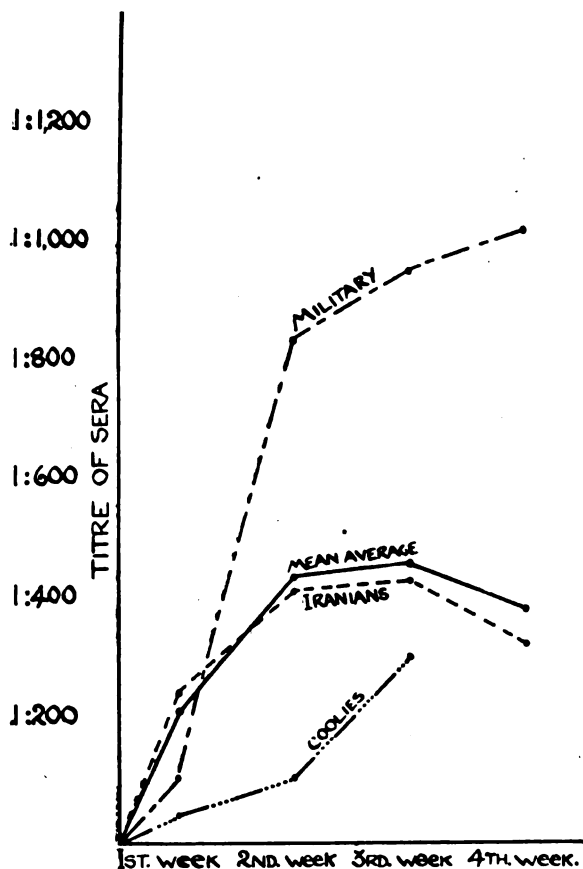
Graph illustrating the rise in *Proteus* OX 19 agglutinins during the course of the disease in different groups of patients

From the results obtained, and which are given in the tables and graphs, certain conclusions can be made. These differ in some respects from those described by Felix (1944) and are discussed below:

(1) The agglutinin response varies in different groups of individuals.

Military cases.—The mortality rate was 21.9 per cent. This group consisted of fit, healthy and well-fed individuals, who came from countries where typhus fever is not endemic and consequently did not have any natural immunity to the disease.

Although only 24 per cent of sera showed a titre over 1:100 when blood was taken between the fifth and seventh days of disease, the titre rose rapidly as the disease progressed



Graph illustrating the mean average weekly *Proteus* O X 19 agglutinin titres obtained in different groups of patients

and between 80 and 90 per cent of the cases produced a diagnostic high titre curve. The significant and high titres were obtained between the eleventh and seventeenth days. The high titres usually persisted for at least fourteen days after the defervescence of the temperature. The highest percentage of all sera showing a titre above 1 : 1,000 was found in this group : titres of 1 : 5,000 and above were only present in 3.9 per cent of cases.

Iranian civilians.—The mortality rate was 12.0 per cent. These individuals were undernourished and came from an area where typhus fever is always endemic and likely to become epidemic.

In this group the highest percentage, viz. 50 per cent of all sera taken in the first week, showed a titre above 1 : 100. The titre rose as the disease progressed, but not to the same height as in the military cases. High agglutinins did not persist to the same degree after the defervescence of the temperature. The high titre diagnostic curve was present in 72 per cent of cases. This is slightly lower than the preceding group. Less than 10 per cent of the sera had a titre above 1 : 640 and under 2 per cent went beyond 1 : 2,560.

Coolie labourers.—The mortality rate was 37.9 per cent. The patients were either old men or young boys who were undernourished and in poor physical condition. They came from areas where typhus fever is always endemic.

Only 27 per cent of the sera of this group showed a diagnostic titre by the end of the second week. The highest titre obtained was 1 : 1,000, but less than 4 per cent of sera gave this titre.

(2) The majority of the cases did not produce titres of diagnostic significance until late in the disease, usually about the twelfth day.

(3) The agglutinin titre produced was not necessarily indicative of the course of the disease. Of 28 sera from fatal military cases, 14 showed titres ranging from 1 : 125 to 1 : 5,000. The proportion of low titre curves obtained from moderately severe Iranian cases is higher than expected.

(4) The age of the patient was not found to have any bearing on the agglutinin titre obtained nor was there a significant difference between the different age-groups.

(5) The percentage of all sera examined from Polish and Iranian patients showing a titre above 1 : 100 is similar. The percentage mortality in both groups is almost the same, and both came from countries where typhus fever is endemic.

(iii) *Proteus* O X2 Agglutinins.—The presence of agglutinins to *Proteus* O X2 suspensions is interesting and cannot be explained unless it is to be regarded as characteristic of the type of disease prevalent. One apparently genuine case belonging to the *Proteus* X2 group did occur. The patient was an I.A.M.C. officer, who was Officer Commanding an Indian Field Hygiene Section. He was not protected by vaccine and had a very severe attack which was complicated by bronchopneumonia and femoral thrombosis. The Weil-Felix test findings are given below :

		10th day	13th day	16th day
O XK	..	1 : 25	1 : 250	1 : 250
O X2	..	1 : 50	1 : 250	1 : 1100
O X19	..	nil	1 : 125	1 : 300

The analysis of *Proteus* O X2 agglutinins obtained from 333 tests carried out on military and coolie cases is given below :

Below 1 : 125	1 : 125	1 : 250	1 : 500	Above 1 : 500
265	38	23	6	1

It was frequently noted that a transient rise in *Proteus* O X2 agglutinins preceded *Proteus* O X19 but, as the titre of the latter increased, the *Proteus* O X2 agglutinins assumed a corresponding lower level.

In the Iranian cases it was found that in 10 per cent of the sera examined the *Proteus* O X2 agglutinins showed significant titres equal to and in a number even higher than *Proteus* O X19.

(b) *Rickettsial Agglutination Reaction*.—In addition to the Weil-Felix reaction, agglutination tests were carried out with rickettsial suspensions on sera from Paiforce by Major C. R. Van Rooyen, R.A.M.C., in his laboratory at Cairo.

This rickettsial agglutination reaction has been fully described by Van Rooyen and Bearcroft (1943).

Over 1,000 sera were sent to Van Rooyen from Iranian civilians treated in the military hospital at Teheran, from Professor Beattie at Baghdad, and from military and civilian cases in other areas of Paiforce.

Van Rooyen (in a personal communication) made the following comments :

(1) During January to April, 1943, there was a widespread epidemic of human typhus fever which affected the whole of Iraq, Iran and Transjordan.

(2) The Weil-Felix tests performed in military laboratories were invariably identical with his own Weil-Felix results.

(3) The rickettsial agglutination reaction showed complete correlation with the Weil-Felix tests.

(4) In a series of 81 sera tested, 75 were epidemic and only 6 murine.

(5) Independent confirmation of the above cases from two sources, i.e. the high death-rate and the results of guinea-pig inoculations.

(6) When considering the rickettsial agglutination reaction, it is important to note that the epidemic component of Craigie's vaccine was made up of one or other of two antigens, either the classic Briens strain isolated in Prague many years ago or the Madrid 4 strain

isolated by Major Snyder from a political prisoner at the Commendores Prison in Madrid during the Spanish Civil War. Both these antigens were tested and the following observations were made. While the Egyptian sera agglutinated both to some extent, the Paiforce sera agglutinated the Brienl strain rather better but the Madrid 4 strain very strongly indeed. The reason one may never know—but it brings out the great importance of verifying the authenticity of strains of antigens to be employed for proposed field immunization work in any particular area.

The right type of antigen must be used for the right place at the right time. Having surveyed the terrain of Paiforce Van Rooyen had no doubt that the Craigie vaccine containing Madrid 4 and murine antigens is the correct immunizing agent to use.

(c) *Wassermann and Kahn Tests*.—(i) *Wassermann Reaction*.—The Wassermann reaction was carried out on too few typhus fever sera to allow any conclusions to be made. A number of Wassermann positive results has been recorded.

(ii) *Kahn Test*.—646 Weil-Felix positive sera from Iranian patients were examined: only 134 (or 20·7 per cent) gave a positive Kahn reading. Positive findings did not depend on the titre of the O X19 agglutinins present in the serum. Of 614 control sera from patients other than clinical typhus fever examined during the same period for syphilis infection, an almost identical percentage (21·4 per cent) was Kahn test positive. As there is a relatively high incidence of syphilis among the civilian population it is not considered that 20 per cent positives of all typhus fever bloods prove the Kahn test to be of any real diagnostic value in typhus fever.

An interesting observation recorded in this connexion was that in nearly one-quarter of the Kahn positive typhus fever sera the O X2 agglutinins were either higher in titre or at least equal to the O X19.

(d) *Gel Tests*.—As the characteristic attack of typhus fever affects the endothelial cells, if not the entire reticulo-endothelial system, various gel tests were carried out.

The "Formogel" test with formaldehyde in serum, associated with the antimony reaction of Chopra in kala-azar, failed to give any interesting results. Of 92 Weil-Felix positive sera treated with formalin, 22, or nearly one-quarter, showed definite gel, but clear without opacity, and this did not increase appreciably on standing.

(e) *The P.C. or Precipitin Colloid Test (Platinum Chloride)*.—Major L. E. Elkerton, I.M.S., in charge of a military laboratory in Teheran, evolved a test which gives an immediate serum reaction. He has called this "the Precipitin Colloid Test (Platinum Chloride)" or as a short title "the P.C. Test."

(i) *Requirements for the Test*:

- (1) 0·664 per cent solution of platinum chloride.—This is eight times the strength of the solution supplied in the poison-testing case.
- (2) Distilled water pH 6·6.—The diluent must be distilled water. The precipitate will not form in saline, in any buffered solution, or in the presence of any other electrolyte, and thus citrate or similar anticoagulants cannot be used to facilitate a bedside reading.
- (3) Rickettsial vaccine.—The clear supernatant fluid obtained either when the vaccine has been standing for some time or after centrifuging is used. The vaccines employed were Canadian, South African and American supplied for protective inoculation of troops.
- (4) Control sera or suitable comparator, e.g. Brown's opacity tubes.—The sera were known positives from typhus fever cases and negative from other cases.
- (5) Patient's serum.—The serum must not be heated in a water bath prior to use as it was found that at temperatures from 56° to 60° C., although strong P.C. positive sera were relatively unaltered, weak positives became negative.

Apparatus:

- (1) Small test-tubes, 3 in. by $\frac{3}{8}$ in., thin glass, rimmed.

(2) Dropping pipette.—This pipette is used throughout the test, and is marked for a volume of 18 drops, which is the standard one volume for determining the relative proportions of all reagents. The exact volume is not important; that generally used was—1 volume = 0.4 to 0.5 c.c. (approximately).

(iii) Preparation of Antigen.—Four volumes of rickettsial vaccine are added to three volumes of platinum-chloride solution. The antigen is ready for immediate use and is sufficient for 100 tests.

(iii) Technique.—This is a one tube test only, and all unknowns and controls are set up in the same way and at the same time without any delay.

One volume (18 drops) distilled water is placed in each test tube, and one drop of serum is then added giving approximately a 1 : 20 dilution. The tubes are well shaken and one drop of antigen is pipetted into each. They are shaken again, and a further one volume of distilled water is added giving approximately a final dilution of 1 : 40. Readings are then taken.

(iv) Readings.—The grade of initial turbidity is estimated, in comparison with controls, i.e. 0; < +; +; ++; +++; +++++. Slight opacity on first addition of the serum to the distilled water and early appearance of a precipitate may be associated with stronger sera.

(v) Findings.—Sera from typhus fever cases and control sera from non-typhus fever cases have been examined by both the P.C. and Weil-Felix tests and the results compared.

ANALYSIS OF FINDINGS FROM 1287 SERA FROM CLINICAL TYPHUS FEVER CASES

	Per cent
Complete agreement with Weil-Felix positives	42.0
Complete agreement with Weil-Felix negatives	9.5
P.C. test stronger than Weil-Felix	25.3
P.C. test weaker than Weil-Felix	14.3
P.C. test negative, when Weil-Felix positive	2.7
P.C. test positive, when Weil-Felix negative	6.2

A table is given below of 5 cases in which the precipitin colloid test was positive earlier than the Weil-Felix.

Cases	Age	Day Fever	Weil-Felix		P.C. Test
			O X2	O X19	
(1) N.A.	19	2	0	0	++
		8	320	640	++++
		12	320	640	++++
(2) S.A.K.	45	2	40	80	++
		6	80	640	++
		9	320	2,560	++++
(3) A.Y.	22	2	40	80	+
		5	40	80	++
		8	320	640	++
(4) Y.A.	20	2	40	40	+
		6	40	80	++
		12	160	160	++++
(5) T.I.	24	3	40	0	+
		11	160	80	++
		30	40	80	++

It was noted that as a rule a typhus fever serum will give a positive P.C. test by the third day, while agglutinins do not appear on an average before the fifth day, and then not in diagnostic titre until later.

Analysis of findings from 670 control sera from Cases Other than Typhus Fever.

It has been found that some supposedly normal sera give a measurable reading with the P.C. test. During the investigation from military patients sent for routine Kahn tests and others from a variety of diseases were examined as controls. Of 614 bloods assumed to be normal 56 (9 per cent) gave a doubtful or weak positive P.C. reaction. Blood from typhoid, malaria, sandfly fever, tuberculosis and short fever cases appeared to give consistently negative reactions. One leprosy and a query kala-azar case gave weak positives.

It seems probable that group precipitins, which are similarly sensitive to the colloid, account for these unrelated reactions.

(vi) Commentary.—The ease, simplicity and immediate reading of the test commends it to the clinician. Findings appear to show that the P.C. test can be a useful adjunct to the Weil-Felix, particularly as differences are in favour of the former.

The precipitate formed during the P.C. test appears to be independent of the proteus agglutinins. The Weil-Felix test can be carried out after the precipitate has been removed without change in titre. Conversely the P.C. test can be performed on a serum diluted 1 : 160 after the removal of the proteus agglutinins. It would appear that the precipitin may be more closely related to the antibodies of the specific infective agent than the proteus agglutinins.

(f) *Non-specific Reactions.*—1,562 sera from Iranian typhus fever cases were examined by Major L. E. Elkerton, I.M.S., for the presence of *B. typhosus* agglutinins. The findings are summarized below :

Titres of T O agglutinins	Nil	1 : 40	1 : 80	1 : 160	Above 1 : 160
No. of sera with agglutinins	1,176	269	71	31	15

T O agglutinins were present in 386 sera (24.7%).

Titre of O X19 agglutinins	Nil	Below 1 : 160	1 : 160	1 : 320	1 : 640	Above 1 : 640	Totals
Sera with T O agglutinins	41	87	49	73	88	48	386
Sera without T O agglutinins	186	262	223	230	196	79	1,176

In assessing the significance of these findings it is necessary to remember that although the civilian population in Iran is not protected with T.A.B. inoculation, typhoid fever is prevalent. The figures do show that a greater proportion of the non-specific T O agglutination was found in sera with a high proteus O X19 agglutinin titre.

(2) Leucocyte Counts.

The results obtained from total and differential leucocyte counts in both fatal and non-fatal cases were so variable as to be of neither diagnostic nor prognostic significance, irrespective as to what day of the disease they were carried out. The majority of the counts performed on fatal cases were within normal limits.

(3) Animal Transmission Experiments.

The animal transmission experiments were carried out by a typhus fever research team which was placed under the command of Major J. Bowie, I.M.S. This team carried out investigations during the spring in the Mosul area in Northern Iraq and at Teheran in Iran. Major C. R. Van Rooyen co-operated and carried out confirmatory transmission experiments in Egypt with material flown over from Bowie. Details of the experimental work were correlated by him.

The investigation had to be carried out in tents under active service conditions. As travelling was done mainly by air, equipment was limited. Four weeks were spent by the team in Northern Iraq and five in Teheran. Material for animal inoculation was obtained from 54 typhus fever patients, 49 of whom were Iraqi or Iranian civilians. The patients selected varied widely, but 52 out of the 54 cases were either febrile or convalescent from typhus fever. About 240 guinea-pigs were used in the experiment—a series of at least one to six animals being employed on each case.

(a) *Technique.*—(i) Patient to guinea-pig.—Venous blood was withdrawn from 52 typhus fever patients and injected into 52 series of guinea pigs, which are divided into four groups according to the type of inoculum used. The disease was successfully transmitted from 19 patients.

Group I. In 31 cases 10 ml. of blood was withdrawn and allowed to clot in the ice-box. Within six hours the clot was macerated in 3 ml. of sterile normal saline and guinea-pigs injected intraperitoneally with 2 ml. of the suspension. Eight series of animals were successfully infected. As this technique proved disappointing other methods were tried.

Group II. In seven cases guinea-pigs were injected at the bedside with 2 ml. of whole blood immediately it had been withdrawn from the vein. Three series of animals were successfully infected.

Group III. In ten cases a suspension of leucocytes was used as the inoculum, 20 ml. of blood were withdrawn into 4 ml. sterile sodium citrate, centrifuged at 2,000 r.p.m. for twenty minutes and the supernatant plasma was pipetted off the leucocyte cream. Within four hours of taking the blood, guinea-pigs were injected intraperitoneally with 2 ml. of leucocyte and upper red blood cell layers. Five series of animals were successfully infected.

Group IV. In four cases a 2 ml. dose of leucocyte was followed next day with the same volume of suspended macerated clot in saline. Three series of animals were successfully infected.

From the results obtained it would appear that 2 ml. of patient's macerated blood clot suspended in saline is not a satisfactory inoculum in attempting to produce experimental typhus fever in guinea-pigs and that an inoculum consisting of leucocytes is more likely to be effective. It was also found that the chances of success in transmitting the infection are greatest in the first week of the disease, slightly less in the second and very slight in the third.

(ii) From lice to guinea-pig.—It was assumed that about eight days must elapse before lice became infective after feeding on febrile patients. Fifteen to twenty days after onset of fever lice were gathered from clothes of 5 typhus fever patients who had evaded admission to hospital. Within three hours of collection the lice were rapidly washed in ether to sterilize the surface as far as possible, ground up with sterile saline in a mortar and guinea-pigs were inoculated intraperitoneally with 2 ml. of the resulting suspension.

Only one strain was isolated from lice. It was established in guinea-pigs by repeating passage and despatched to Middle East. The histological lesions produced by this strain were very definite from the first animal onwards.

(iii) From guinea-pig to guinea-pig.—The animal was killed on the second or third day of continuous fever, usually between the tenth and fourteenth day after injection. Using strict aseptic precautions, one half of the cerebrum was removed from the cranial cavity, ground up in a sterile mortar, suspended in 5 ml. sterile normal saline and 2 ml. injected intraperitoneally into the next passage animal.

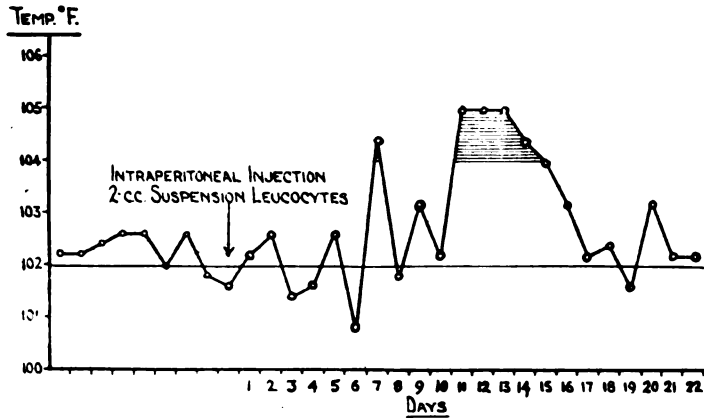
(b) *The Febrile Reaction in Guinea-pigs.*—Experimental exanthematic typhus fever in guinea-pigs is not a severe disease and the animals do not appear to be ill. Great difficulty was first experienced in determining the presence or absence of a specific febrile reaction in guinea-pigs. The essential feature is the registration of intra-abdominal as opposed to rectal temperatures. It is the only accurate method by which the correct internal temperature in guinea-pigs may be ascertained. The use of this method is also referred to in the Official History of the War, Medical Services, Pathology (1923). Only by this can the characteristic curve be observed in typhus fever-infected guinea-pigs. This difference between the abdominal and rectal temperatures is illustrated in temperature Charts 2 and 3.

Among healthy guinea-pigs the abdominal temperature was found to vary from 101 to 102° F. between 0600 and 0800 hours and before the morning feed. Prior to their use as passage animals daily temperatures were taken for three days. To exclude subclinical natural disease, guinea-pigs showing a greater variation in daily temperatures of more than 2° F. or with a maximum morning temperature of more than 102° F. were not used in the investigation.

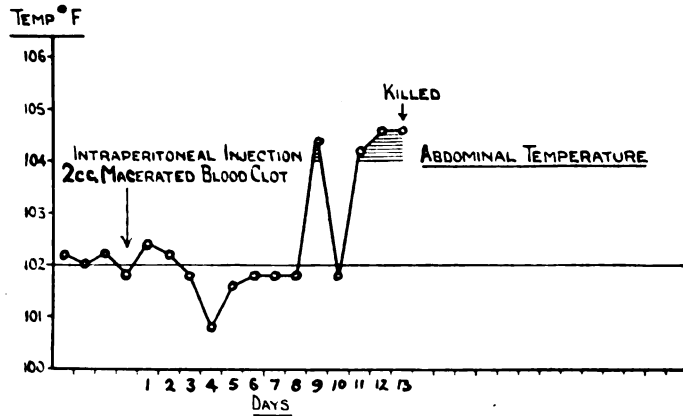
The characteristics observed in the temperature charts of typhus fever-infected guinea-pigs were as follows: (1) An incubation period of six to eight days (extremes five to nine days), (2) a sharp rise and fall in one day, followed by (3) an afebrile interval of two to four days,

then (4) a second rise between the ninth and twelfth day which is sustained as a continuous temperature for four to six days at least 2°F . above the animal's average normal temperature, and, finally (5) the temperature falls by crisis.

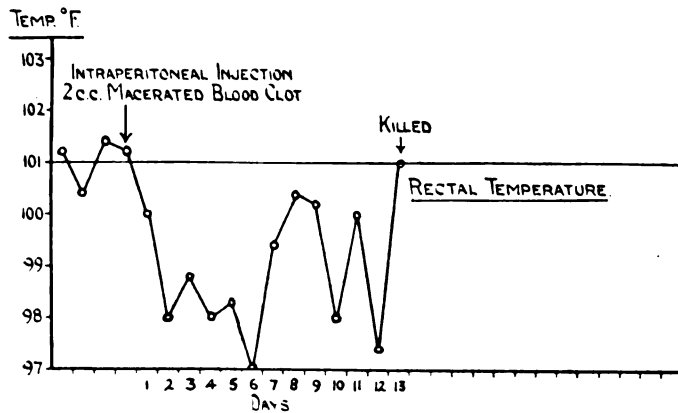
TEMP. CHART NO. 1



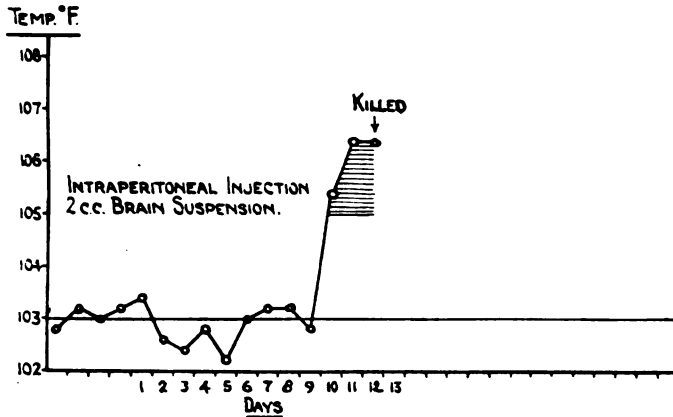
TEMP. CHART NO. 2



TEMP. CHART No. 3



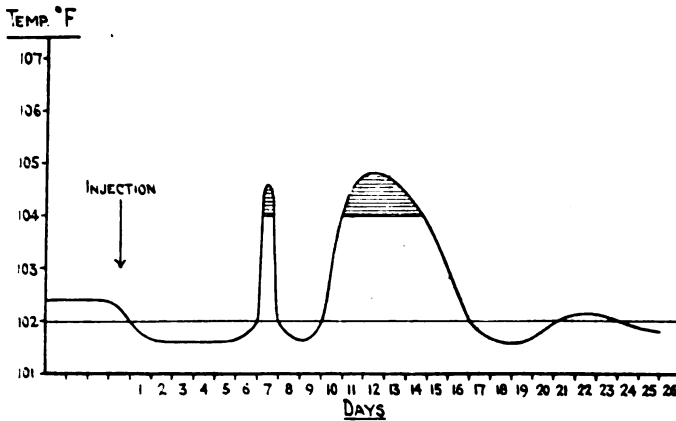
TEMP. CHART NO. 4



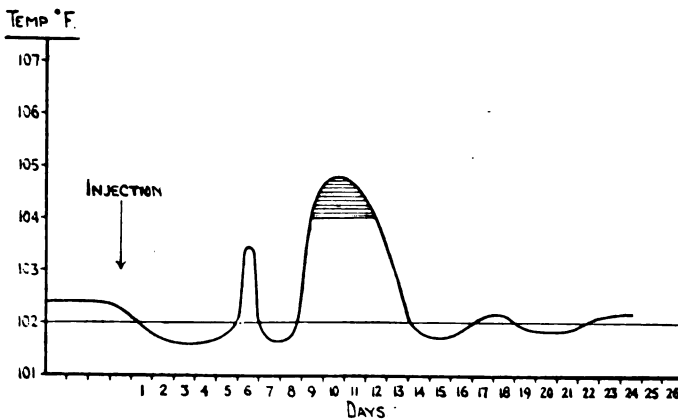
The common form of the characteristic temperature curve is shown in Curve 1. Charts 1 and 2 are the actual records of animals which had typical febrile reactions.

Particularly among passage animals, what may be termed a "shift to the left," was observed in some temperature charts. Here the onset and course of the febrile reaction is rapid and the temperature during the period of continuous fever may reach 107° F. The first sharp

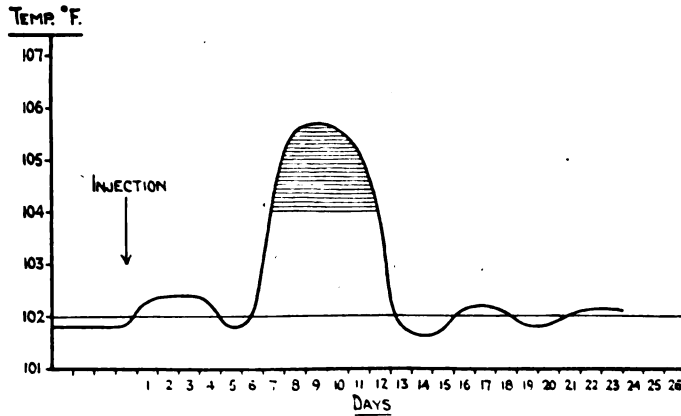
CHARACTERISTIC TEMP. CURVE NO. 1



CHARACTERISTIC TEMP. CURVE NO. 2



CHARACTERISTIC TEMP. CURVE NO. 3



rise and fall in one day occurs early and may be of such short duration that either it is missed altogether where temperatures are registered only once daily (Curve 3 and Chart 4) or it is only observed during the rise or fall, so that the rise appears small (Curve 2).

A "shift to the right," usually occurs in the first animal of a passage series. The primary rise and fall may appear as late as the ninth day and the following afebrile period may be as long as four days, so that the period of continuous temperature only begins on the thirteenth day. But when the inoculum consisted of a suspension of leucocytes, the curve of the febrile reaction even in the first guinea-pig is almost without exception as shown in Curve 1.

It would appear that a "shift to the left" may occur where the strain is more than usually virulent for susceptible animals or where the infecting dose is large, but a "shift to the right" may indicate low virulence or small infecting dose.

(c) *Morbid Anatomy*.—With the exception of the tunica reaction, the macroscopic changes are not remarkable and are confined to the serous cavities. The peritoneum loses its smooth glistening appearance and becomes flushed and thickened. There is free fluid in the peritoneal cavity and often there is a delicate, thin, filmy exudate over the spleen which is not appreciably enlarged. The mesentery and bowel are hyperæmic. Small petechial hæmorrhages may be present below visceral and parietal peritoneum and in the pericardium. The membranes over the surface of the brain are hyperæmic, dull and thickened.

One of the main objects of the team was to ascertain whether scrotal reactions occurred. This phenomenon may be observed in guinea-pigs infected with the murine strain. It then consists of an inflammation in the scrotal wall which may become gangrenous. In animals infected with exanthematic typhus fever, the genital lesion is milder and limited to the immediate coverings of the testicle, i.e. the tunica reaction.

No scrotal reactions but six tunica reactions were observed at post-mortem examination of experimental animals infected in Iran and Iraq.

In the presence of the tunica reaction, due to typhus fever infection, the testicle becomes fixed within its muscular diverticulum, the wall of which becomes swollen and more firmly bound down in its scrotal bed. The sac is therefore no longer able to extrude the testicle into the abdomen. Except in patches which are occupied by a cellular exudate, the two layers of the tunica vaginalis become adherent and anchor the testicle even more firmly. Externally the scrotum appears slightly swollen and flushed.

When the testicle is forcibly withdrawn from its coverings, the surface is raw; this is due to irregular laceration of the tunica albuginea and internal spermatic fascia which have become continuous through the adhesions between the visceral and parietal tunica vaginalis.

During the greater part of the investigation, it was not realized that the tunica reaction may be of a transient nature. It may pass off between the tenth and thirteenth day after

injection and should therefore be examined for daily by digital pressure over the scrotum at the time temperatures are registered. This had not been done; consequently the fact that only six tunica reactions were observed at post-mortem examination of 48 febrile male guinea-pigs is probably of little significance as an index of the actual frequency of this reaction.

(d) *Morbid Histology*.—It would appear that as in human cases the essential change in the organs is an inflammation of small blood-vessels and their supporting areolar tissue. The findings described below are not those usually associated with epidemic typhus fever infection in guinea-pigs.

The Brain.—The hyperplastic activity begins with the rise in temperature, about the seventh or eighth day after injection. This is at first generalized but most pronounced in the grey matter of the cortex and basal ganglia at the junction with the white, being particularly obvious in the comparatively acellular molecular lamina immediately below the pia-mater. Over the whole surface of the brain, the areolar tissue of the membranes is hyperplastic and the pia-arachnoid spaces are crowded with young endothelial cells, mononuclear cells, plasma cells and leucocytes; the cells may extend for some distance into the brain along the perivascular spaces.

No histological change was found in the choroid plexus or ependyma lining the ventricles.

With the onset of the continuous temperature period, young endothelial cells are aggregated in the form of Wolbach nodules with prominent dilated capillaries as their focal points. At first, the aggregations are large and loose at their periphery, as though endothelial cells were infiltrating areas of particularly active hyperplasia. Later, the characteristic nodule is formed in which the cells are more densely packed. With the exception of a few eosinophilic leucocytes, the new cells appear to originate from vascular endothelium or associated areolar tissue cells. Pre-existing nerve and neuroglia cells involved in the nodule show no obvious histological change. Gold and silver stains were not available in this investigation.

About the second day of continuous temperature, the generalized hyperplasia passes off and a few cells, near the centre of the nodule, show karyorrhexis of their nuclei.

It is probable that blood-flow through capillaries in the nodule ceases at this time. Owing to the dense cellularity, the capillary outline may be indistinguishable. Thrombosis is not a feature of exanthematic typhus fever in guinea-pigs. Occasional dilated capillaries in the brain appear to be blocked by masses of endothelial cells but no organizing thrombi were found in any of the brains examined.

After the third day of continuous fever, cells in the nodules disperse and when the temperature has reached normal no nodules remain and there is no gliosis.

Lungs.—In the walls of the alveoli throughout the lung, hyperplasia of capillary lining can be distinguished. In the larger vessels, the supporting areolar tissue of the adventitia is hyperplastic and the ground substance and lymph channels of this tissue are crowded with young endothelial cells, large mononuclear cells, plasma cells, a few lymphocytes and occasional eosinophilic leucocytes. Among these cells, as in the nodules of the brain, there are pyknotic globules, varying in size from 1μ to 3μ , the nature of which is not clear.

Heart.—In the heart, a cellularity of the areolar tissue in the periphery of vessels separates the bundles of muscle fibres, but some increase in size and number of muscle cell nuclei occurs. The cells present are endothelial, large mononuclear cells, plasma cells with occasional lymphocytes and eosinophilic leucocytes.

Lymph channels accompanying vessels in the cellular areas are distended with cells and phagocytosed pyknotic cell debris.

Kidney.—In the kidney, the lesions are scanty and consist of occasional localized areas of hyperplasia in connective tissue.

The most common site is just external to the malpighian body. The nodule begins in connexion with the areolar tissue coat of vessels to and from the glomerulus, just external to Bowman's capsule.

The condition may be termed an interstitial proliferative glomerulitis.

The Male Generative Organs.—In the testicles there is an inflammatory hyperæmia, cellularity and thickening of the tunica vasculosa under the tunica alba. The cremaster and external spermatic muscle laminæ share in this change and the thickening is marked. In the interstitial tissue of these structures, associated with engorged vessels, there is an increase of cells of the same type as those found in the hyperplastic interstitial tissue of the heart and lungs. Related lymph channels, numerous in the genital organs, are dilated; among the cells within the lymph channels, there are pyknotic globules, often without macrophages.

The remaining laminæ of the testicular coverings and subscrotal fascia show a marked increase in connective tissue cells.

In spaces between the adhesions of visceral and parietal tunica vaginalis, there is a cellular exudate identical in character with that in the peritonea.

In the epididymis, there is a generalized increase of areolar tissue cells and a nodular periarteritis in the fine terminal branches of the internal spermatic artery which supplies the epididymis.

It would appear, from the macroscopic and microscopic appearances found in guinea-pigs infected with typhus fever in Iraq and Iran, that the genital lesion is a modified scrotal reaction and that the so-called "tunica reaction" is in reality a misnomer.

(e) *Demonstration of Rickettsiæ in Animal Tissues.*—Smear preparations from the peritoneum and tunica vaginalis were examined in more than 120 guinea-pig post-mortem examinations. For routine purposes, Giemsa's stain and, in selected cases, Marchiavello's method was used.

In many febrile guinea-pigs numerous acidophilic extracellular bodies, variable in size and pleomorphic, were seen throughout the exudate. These bodies were coccal, diplococcal, bacillary, with and without granules, and lanceolate with bipolar staining. These structures were not only seen in peritoneal smears from animals later proved histologically typhus fever, but in smears from histologically negative cases. In three infected animals, the staining of the coagulated protein of the exudate resembled smear preparations of Craigie's concentrated vaccine.

On four occasions, fine filamentous structures about 0.5μ in diameter were seen within macrophages. They stained red by Macchiavello's method.

Sections of normal human and guinea-pig tissues and many sections of granulomatous inflammations were examined. It was found that cells of connective tissues, definitely not eosinophil leucocytes, may show granules similar to those described as rickettsiæ. Such granules exist in normal and pathological tissues more than was realized.

(f) *Commentary.*—Thirty one animals infected with strains of epidemic typhus fever isolated in Mosul, Suleimanyia and Teheran were sent to Major C. R. Van Rooyen in Egypt. He has made the following observations:

(i) There were certain pathological differences between the Egyptian and the Iraq-Iran types. The latter are more virulent and cause more intense lesions in the guinea-pigs with marked scrotal congestion (*never* true orchitis, adhesions, or matting) and petechial hæmorrhages which were just like a typhus fever rash in a guinea-pig's peritoneum. No Egyptian strain encountered by him or Colonel Plotz (U.S. Army Medical Corps), who isolated some 70 or more, has behaved in this way.

(ii) He believed that the epidemic typhus fever of Iraq-Iran is of a type peculiar to those countries, characterized by minute peritoneal hæmorrhages in guinea-pigs; also by frequent nodules in these animals' brains which he has never found in over 200 guinea-pigs studied in the Egyptian disease.

(iii) That this disease is true epidemic typhus fever is based on the following facts: That not only the human patient but also the injected guinea-pig from the same case gave high-titre epidemic rickettsial agglutination.

(F) GENERAL COMMENTARY AND SUMMARY

This is a record of an investigation carried out by personnel of the R.A.M.C. and the I.A.M.C. under the direction of Major-General J. G. Gill, *C.B.E., D.S.O., M.C.*, the Director of Medical Services, Paiforce. Full details are given of a comprehensive survey of the outbreak of typhus fever which occurred during the first seven months of 1942 in Iran and Iraq. The disease has been investigated in cases which occurred among British and Indian troops, Polish soldiers, Iranian civilians and coolie labourers. It was mainly due to the fact that the disease was spread over a very extensive area and covered a period of seven months that it was possible to carry out such an extensive investigation. Cases of typhus fever continued into the really hot weather of June and July, a time when heatstroke was occurring in Southern Iran and Southern Iraq. In these areas, pathologists were working in shade temperatures of over 110° F. Morbid histology could only be done with difficulty as no microtome for cutting frozen sections was available. In reviewing the results obtained under trying active service conditions, and without any special equipment, pathologists and their laboratory assistants must be given full credit for their accomplishments.

A summary of the findings follows :

(1) *Epidemiology*.—Conditions in Iran were especially favourable to an epidemic of typhus fever. The economic state of the poorer classes was deplorable. The wheat crop was inadequate for the needs of the country and the price of bread, the staple article of food, soared to unprecedented heights. The starving population, ill-clad and verminous, wandered from town to town and across the frontier into Iraq in search of food and work. The winter of 1942–43 in Northern Iran was unusually severe. The spread of the disease followed the trade routes. The maximum incidence occurred during April, May and June. Conditions were very similar to those prevailing when typhus fever occurred during the Mesopotamia Campaign of 1914–18. The mortality rates varied in the military forces and the different groups of the civilian population.

(2) *Preventative measures* have been discussed and were chiefly aimed at the prevention of louse infestation and checking the spread of the disease. The low incidence of typhus fever among military personnel, living under unfavourable conditions, is proof of the efficacy of the measures adopted.

(3) *Prophylactic inoculation* was carried out but, as this was given during the course of an epidemic, it is difficult to assess its true value. The incidence of the disease and the mortality rates were, however, less among the inoculated than the non-inoculated.

(4) *Clinically* the disease did not differ in any marked degree from the textbook description of typhus fever. The prognostic value of certain signs and symptoms has been discussed.

(5) *Pathology*.—Tissues from typical cases of typhus fever have been examined both abroad and at Edinburgh University. Full details of the observations made are given and illustrated by microphotographs. These in the main conform to those described by Wolbach *et al.* (1922). Some additional findings are also recorded. The presence of rickettsiae in human tissues has also been discussed.

(6) *Treatment*.—No new advances have been made. Convalescent serum was not available. Sulphanilamide proved to be of no value in influencing the course of the disease.

(7) *Laboratory diagnosis*.—(a) The Weil-Felix test was used extensively as the standard method of laboratory diagnosis but, owing to the relatively late appearance of significant high titre agglutinins, was considered to have only a limited value except in doubtful or atypical cases, since the clinical diagnosis was generally obvious before a positive serological result could be obtained. It was found that the agglutinin response varied in different groups of individuals, and appeared to depend on whether they came from countries where typhus fever was endemic or not. Findings have been fully analysed, and the presence of Felix's high and low titre curves discussed. (b) Wassermann, Kahn and Gel tests were carried out, but no information of any diagnostic significance was obtained. (c) Rickettsial agglutination reactions were carried out by Van Rooyen in Egypt. He showed that the Iran-Iraq typhus

fever was the true epidemic type and related serologically to the Madrid 4 strain. (d) The precipitin-colloid test is a new precipitin test evolved by Major L. E. Elkerton, I.M.S. He used as his antigen a mixture of rickettsial vaccine and platinum chloride solution. Full details of the test are given in the text, but its value must remain *sub judice* until further work has been carried out. (e) Leucocyte counts, both differential and total, were carried out. Findings were variable but, in the majority of cases, were within normal limits and of no diagnostic or prognostic value.

(8) *Animal transmission experiments* were investigated by Major J. Bowie, I.M.S., with the assistance of Major C. R. Van Rooyen, R.A.M.C. These showed that the Iran-Iraq strain differed from and was more virulent than the Egyptian, producing a tunica reaction in guinea-pigs but not true orchitis. Frequent nodules were present in the brains of these animals. Van Rooyen had not seen similar nodules in the brains of guinea-pigs infected with the Egyptian strain.

(G) ACKNOWLEDGMENTS.

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MALARIA CONTROL IN MOBILE WARFARE. ITALIAN CAMPAIGN 1943-1945.

BY

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FOURTEEN hundred years ago Justinian's general, "the genial Belisarius," undertook a war in Italy which foreshadowed in astonishing detail the campaign of 1943-1945. From Sicily by Reggio and Salerno to Naples, from Naples to Rome, from Rome by "the rock of the Apennine" to Ancona and Rimini; step by step he forced the Germans (Goths) to their last shelter at Ravenna, and brought a four-year struggle to a triumphant conclusion in the same malaria-ridden plains which saw the final destruction of Kesselring's army.

Had this miniature edition of the recent campaign taken place in modern times its medical history might have afforded some interesting parallels. Unfortunately no such basis for comparison exists. The Italian campaign in the last war (1914-1918), for example, was fought under conditions so different that it would be idle to compare them. In any case, even if such comparisons were valid they would obscure the most interesting point about the battle against malaria in Italy, which is the fact that this campaign witnessed, not so much an improvement, as a revolution in the methods of combating malaria in war.

When the Eighth Army landed in Sicily its conception of malaria prophylaxis was not two steps ahead of the previous war. By the close of the campaign the control of malaria in mobile warfare had emerged as a practical proposition for the first time in military history. Given the necessary discipline and training, there is no reason why mobile operations in Europe should ever again be attended by heavy casualties from malaria.

Power sprayers; D.D.T.; aerosol bombs; an effective repellent—these, and the Jeep, have made it possible for an army to protect itself from malaria under the most difficult conditions. In studying the Italian campaign we can watch the effect of their introduction, first on the theory of malaria prevention, later and more tardily their results in the field. The evolution was never completed and malaria claimed its victims to the end, but they fell by tens where formerly they would have tumbled down in hundreds.

Sicily witnessed a medical disaster which repeated on a small scale many much-quoted episodes of previous wars, but which did not, fortunately, affect the outcome. The battle of the Lombardy Plain saw a new organization based on the new theory in full operation for the first time. The chief object of this paper is to trace the administrative steps which led from one to the other. To assess what was actually achieved is difficult, but it is significant

that after the initial set-back in Sicily—an experience which those who were present never forgot—control measures were so effective that many medical officers are now unwilling to believe that any other region in Italy is really highly malarious.

MALARIA IN ITALY.

In 1740, Horace Walpole mentioned “a horrid thing called the mal’aria, that comes to Rome every summer and kills one.” It first “came to Rome” about 200 B.C., after the second Punic War, and throughout the ages a high prevalence in Italy has frequently been associated with the devastation of war. The sacking of Rome early in the fifth century A.D. and again in the sixteenth century were followed, for example, by severe exacerbations of malaria. Some evidence however, has been adduced (Celli) to show that apart from the influence of war on the one hand, and man’s efforts at control on the other, waves of increase and decline extending over centuries at a time have occurred in Italy, the last of which began its “natural” decline about fifty years ago. It is not easy, therefore, to predict with confidence what the malarial condition of any part of Italy will be in a particular set of circumstances.

Hackett, in his celebrated work “Malaria in Europe,” used two interesting maps to demonstrate the manner in which the mortality from malaria in Italy declined in the forty-year period up to 1930. These show clearly that while the decline has been enormous, the distribution of the worst areas remains the same—namely (excluding Sardinia), the Foggia and Taranto plains and the southern half of Sicily. In other words, a glance at the malaria map must have suggested when the Italian campaign was planned that the invaders were about to be thrown into contact with the worst of whatever malarial risks the country might be able to offer.

How bad it was likely to be nobody could have predicted with certainty. In 1887 the malaria mortality in Italy was 710 per million; by 1914 it had fallen to 57. During the last war it rose year by year to a peak of 324 in 1918, but by 1939 it had been reduced to the low level of 14 per million. From 1924 onwards the reduction had been partially, and perhaps largely, due to land reclamation schemes carried out under the direction of the Rockefeller Experimental Station in Rome. It soon became clear that the systematic destruction of these bonification schemes was part of the policy of the German Army in retreat, but to what extent this would result in an increase in malaria was a problem to which there could be no definite answer.

Long after the Allies had established themselves in Italy, and access had been gained to the best Italian sources of information, the same uncertainty existed regarding the parts of Italy as yet unoccupied. At the end of June, 1944, one malariologist was rash enough to circulate a “Review of the Malaria Situation in Italy,” based upon data obtained from certain reputable authorities. This had no sooner appeared than it was fallen upon by the malariologists of another unit, who declared themselves, at considerable length and not without heat, to be “at variance with most of his points.” They insisted that neither the past history of malaria in Italy, nor malaria morbidity figures, nor spleen nor parasite rates, could be accepted as indices

of the state of any district in Italy under the peculiar conditions of warfare ; the habits of the vector were liable to change, intensive medication of the population in malarious areas made spleen and parasite surveys unreliable, and a fluid refugee population reduced prediction based on pre-existing conditions to absurdity.

PLANNING FOR SICILY.

At the close of the Sicilian campaign the lessons of the operation were reviewed. The reports make interesting reading. It was easy then, and it is easier now, to discover faults, when the critic is unhampered by the practical administrative difficulties of a large combined operation, the forces and staffs of which were dispersed over three widely separated Commands.

The original instructions were excellent ; reliance was to be placed in the initial stages on mepacrine, protective cream (Mark II), clothing precautions, and head-nets for assault troops. Later, "as soon as possible after landing," nets or sandfly-proof bivouacs were to be provided and flysol spraying was to be carried out. It is only when one studies the results that the loopholes in the original plan become obvious ; which is not the same thing as saying that they could have been avoided. For example, it was soon evident that most troops who went into action wearing shorts would not, and often could not, change into slacks after sundown, and it was realized that it would have been better not to have issued shorts at all. Yet it was eighteen months, and the third season in Italy, before repeated medical representations resulted in a temporary and grudging withdrawal of shorts from troops in a highly malarious zone of operations.

Sicily was the Eighth Army's first contact with malaria and, even if the training and equipment had been beyond criticism, casualties would certainly have been suffered through inexperience. As it was, later investigation showed that too much of the training had been theoretical. The D.D.H., Middle East (Colonel A. E. Richmond, *C.B.E.*), after a visit to Sicily when the epidemic was at its height, commented that "practical training (in the use of individual protective measures) had not been adequate—this as distinct from theoretical instruction, of which much had been given. It is felt that one and a half hours at least per week should be included in the training programme of all units likely to proceed to malarious areas. This instruction should include the actual putting up of bush-nets and bivouacs, the application of cream, important points in the selection of camp sites, etc."

The 1st Canadian Division prepared for the operation in England and Scotland. They were particularly unfortunate in regard to malaria training. Certain vital instructions about precautions and planning were either lost in transit from Cairo or very much delayed, and no clear direction was received until the D.D.M.S., 30 Corps, visited the division in the U.K. only five weeks before the date of the actual landing in Sicily. A specially trained malaria officer, who was provided by Middle East and flown home, was so much delayed *en route* that he only joined the division three days before embarkation. It is hardly surprising that the A.D.M.S., 1st Cdn. Div., commented rather bitterly : "Planning for protection against malaria offered many problems mostly caused by lack of clear information of the conditions to be

met and inexperience with the disease in general. In this one thing alone, one feels that concise, comprehensive instructions should be made available to English-planning staffs, at once. Information trickled in slowly and seemed incomplete. Time for planning was brief and there was no time for extensive training of special personnel. Equipment was provided so late that no one had time to see it, let alone become familiar with it." He mentions, also, that "for reasons of security medical officers were not allowed to commence the study and discussion of malaria and other tropical diseases until too late on in the planning."

The inadequacies of training showed themselves in many ways, all of which contributed to the casualty figures. The irregular taking of mepacrine and lack of supervision in regard to it, carelessness over clothing (individuals in shorts, or even without shirts after sundown, and officers wearing cut sleeves, were common sights in the early stages), failure to use protective cream, lack of understanding of the purpose of head-nets, bad camp site selection—all are mentioned again and again in the reports.

As so much reliance had been placed on mepacrine it was unfortunate that the administrative arrangements should not have been perfect. Formations complained, with some justification, of a lack of uniformity in regard to the prescribed regime, and a verbal loophole in an Army Instruction appears to have led to a widespread impression that mepacrine was only to be taken for a period of five weeks.

The most obvious error in regard to equipment was the fact that mosquito-nets were not a personal issue. Several different types were provided (bush-nets, sandfly curtains, bivouacs for two men) and they were held on charge by units and were supposed to arrive with the unit transport. In many instances they were very much delayed—one unit had arranged for the nets to arrive on "D plus 20" transport, and one brigade was still without nets a month after landing. It is hardly surprising to find that these particular units had very heavy casualties.

Another mistake which probably had an unfortunate indirect influence on the whole of the subsequent campaign was that the old Mark I cream was issued to 13 Corps instead of the much more acceptable and more efficient Mark II cream which had been authorized. This was the origin of a prejudice against repellents of any and every kind, which lingered until the end of the war. Men who had been in Sicily swore that "anti-mosquito cream" actually attracted mosquitoes.

Failure to ensure that malaria control units and the malaria field laboratory got their transport across at an early stage greatly restricted their usefulness. A month after the landing the O.C., Malaria Field Laboratory, who was also Adviser in Malaria to Headquarters, Eighth Army, was still without a car for his personal use. The effect on the efficiency of the laboratory was reflected in some acid criticisms by one A.D.M.S. who complained that malaria survey reports were received so late that they had only a "nuisance value." If there was any justification in this criticism at the time, there was certainly none thereafter. Once the field laboratories were provided with the independence and mobility they asked for they constantly operated so far forward that accurate reports were often available within twenty-four hours of the capture

of a new area, and on many occasions they carried out their surveys under fire.

The Anti-Malaria Control Units for the Sicily operation were thrown together in haphazard fashion; being "A" units with a medical role they were nobody's baby, and nothing about them was satisfactory. They were formed too late or not formed at all; the personnel were unsatisfactory; they were untrained or wrongly trained; one A.M.C.U. lost itself in Tunisia and never reached Sicily; others arrived without officers, without transport, without equipment. When they did at last get to work their operations were unco-ordinated because the parent formations were constantly on the move and had no clear idea how to employ them. It was soon realized that the only way to use them effectively was to place them under central control at Army, a solution which raised what someone described as "screams of parochial dismay," and a compromise had to be accepted; one of the two Units with each division came under Army control, the other remained with its formation.

The second season in Italy was far advanced before an effective system for employing A.M.C.U.s under mobile conditions had been worked out, and—a much more difficult proposition—put into operation despite the parochial feelings of the diehards. Many difficulties would have been avoided if malaria control units had been mobilized in the first instance as medical units on an Army and District basis.

SICILY AND AFTER, 1943.

What happened in Sicily may be briefly described.

D-Day was July 10. During the first fortnight there were about 200 cases of malaria due to infection elsewhere. About July 23, the Sicilian mosquitoes began to take their toll and cases poured into the medical units in alarming and increasing numbers. In the first week in August there were 1,302 malaria admissions, in the second there were 1,819; this latter was the peak. By September 3, when the invasion of the Italian mainland began, the Sicilian campaign had produced 7,138 cases of malaria and 3,257 "N.Y.D. Fevers"—a possible total of 10,395 casualties due to malaria. From August 1 to September 3 the malaria wastage was 0.88 per 1,000 *per diem*; if "N.Y.D. Fever" is included the daily wastage becomes 1.24 per 1,000.

The heaviest toll was from 5 Div. and 50 (Northumberland) Div., who were infected in the highly malarious Lentini-Catania Plains. To quote the A.D.M.S., 50 (Northumberland) Div.:—

"For three and a half weeks, during the battle of Primosole Bridge and in the plain south of Catania, the Division was deployed on a two Brigade front, with the third Brigade close up in reserve. These Brigades and supporting arms were in the centre of a 'red' (highly malarious) area on the malaria map. They were overlooked by the enemy, and movement had to be mainly confined to the hours of darkness. The fighting conditions were hard, the ground littered with dead bodies and enemy refuse, the troops were widely scattered and before the final withdrawal of the enemy . . . the troops engaged in these battles began to show definite signs of fatigue." This Division had 1,217 cases of malaria; five of its Infantry battalions sustained 433 casualties from malaria between them.

The severity of the outbreak caused surprise and anxiety amongst the staffs at all levels, and unit commanders admitted freely that they had never fully realized the danger, despite the instructions and warnings which had been given. The D.D.H., Middle East, recorded that he had been told that "junior officers and senior N.C.O.s set a particularly bad example as regards individual measures of protection. It was also very clear that formation staffs were not blameless. . . . It was credibly reported that one area commander was notorious for his disregard of personal anti-malaria precautions."

It is unnecessary to describe the measures which were taken once the danger was realized, as these have been sufficiently indicated in the criticisms mentioned above.

Sicily left a legacy which contributed very largely to the malaria incidence during the first three weeks on the Italian mainland. Between September 4 and November 27 a total of 15,547 cases of malaria and fevers N.Y.D. was admitted to medical units in the Eighth Army, and of these at least 8,000 were due to infection in Sicily. Four weeks after the landing at Reggio there was a dramatic fall in the number of malaria admissions from 1,477 in one week to 523 in the next (week ending October 2) and thereafter the incidence gradually declined. On the whole the danger was less acute than in Sicily, the season was farther advanced, and the malaria discipline was rapidly improving.

To preserve a just perspective, it should be realized that the malaria casualties in the Sicilian campaign were small compared with those suffered by British forces on many occasions in the last war. The average incidence in Sicily during the worst six weeks of active operations (July 23 to September 3) was equivalent to 275 per 1,000 per annum. This seems high; but in Macedonia in 1918 the incidence *for the whole year* was almost 460 per 1,000 (59,087 cases) for the entire force.

Sicily was the Jutland Battle of the struggle against malaria in the Italian campaign. Our casualties were severe, amounting almost to a defeat in themselves, but they did not affect the outcome; and thenceforward there was never a time when malaria caused any serious operational embarrassment.

NEW WEAPONS AND A FRESH ORIENTATION.

At the close of his account of malaria in Macedonia in the Official Medical History of the last war, Colonel C. M. Wenyon made the following observation:—

"It would seem that a properly carried out campaign of protection against the mosquito would have reduced the incidence of malaria more than the unavoidably imperfect and partial anti-larval work carried out in Macedonia."

The fact that in mobile warfare, in particular, adult mosquito destruction is the best method of supplementing personal protective measures was realized long before any practical means existed for putting the idea into effect. The 13 Corps medical plan for the assault on the Italian mainland laid special emphasis on the importance of spraying out "all tents and all rooms of all buildings within 3 kilometres" of each unit, using flysol and flit guns. The

idea was good but difficult to put into practice, one reason being that at that time—and indeed for long afterwards—too much emphasis was always placed during training upon anti-larval measures.

At the end of March, 1944, details of a number of developments which appeared to make possible destruction of adult mosquitoes on a large scale were first received in Italy :—

(a) Power sprayers.

(b) “ D.D.T.”—Dichlor-diphenyl-trichlorethane.

(c) Insecticidal “ sparklets,” each weighing about an ounce, intended as an individual issue to forward troops.

Small quantities of D.D.T. arrived in April and, in the same month, the first consignment of power sprayers was issued to the Eighth Army. The sparklets failed to materialize and a supply of Westinghouse Aerosol Bombs was asked for instead ; but it was over a year before either of these items became available in any quantity, and they were never employed by British troops during active operations in Italy.

Experiments with D.D.T. as a residual spray in buildings confirmed the claims which had been made for it, and it was quickly realized that a new phase had opened in the battle against malaria in the field. It was estimated that rooms treated in the prescribed manner, using 5 per cent D.D.T. in kerosene, would remain lethal for about two months to mosquitoes which rested in them. It should be possible, therefore, to achieve a high degree of control over newly occupied areas in the minimum of time and, in combination with the usual personal protective measures, this method offered, for the first time in military history, the possibility of really effective malaria control in forward areas.

Solutions of D.D.T. are dangerous if carelessly handled, and personnel who mixed and applied them had to be specially trained ; the obvious answer was to confine the use of D.D.T. to A.M.C.U.s, and to co-ordinate their activities so that all areas were treated systematically, with due regard to the distribution of troops and the results of surveys by the malariologists.

The credit for working out an effective organization on these lines in the Eighth Army is due to Lieut.-Colonel J. Morgan, *O.B.E.*, *I.M.S.*, who was *A.D.H.*, Eighth Army, until his death in August, 1944. The recommendation that all Malaria Control Units should be put under the command of Army H.Q. was made in the early days in Sicily, but the welding into an effective weapon of this conglomeration of ill-found, badly trained and often recalcitrant units was a formidable task. Amongst them were many individuals who were keen and reliable, but on the whole the conditions under which these units had been formed had made them the repository of the misfits and throw-outs of every arm of the Service. As late as July, 1944, we find the following remarks in a letter by Lieut.-Colonel Morgan about the D.D.T. spraying scheme, in which the A.M.C.U.s used Italian Labour who could not be closely supervised to spray out farms :—

“ The officers and men are so poor in type that we have to keep ringing the changes constantly. They *must* be better personnel than we get as they have to work independently. They have gifts and vino thrust upon them on all

sides and their round frequently degenerates into a bibulous, hiccupping procession in which the B.O.R. is carried along by the Italian labour."

Eventually, however, every difficulty was overcome, and it was found that when properly supervised these units did excellent work and showed an unexpected keenness. The power sprayers initially supplied proved to be unsuitable for D.D.T. spraying as they could not be adjusted to give a satisfactory wetting spray and tended to overheat with prolonged running. They were therefore switched over to flysol spraying and knapsack sprayers were used instead for the application of D.D.T. The method of operation under active conditions was briefly as follows :—

(a) One A.M.C.U. formed a Malaria Control Depot, located near Army H.Q. This depot prepared and issued the D.D.T. solution and supplied labour and materials of every description, rations, mail, pay, orders, survey reports, etc., to all A.M.C.U.s by means of a despatch service which visited each A.M.C.U. every second day. This made the A.M.C.U.s independent of the moves of local formations.

(b) One A.M.C.U. was organized as a Forward Spraying Unit. Flysol power-spraying teams, each consisting of a driver and two operators equipped with a power sprayer mounted on a vehicle (a Jeep for preference), were allocated on a divisional basis and covered the entire front. They operated from Field Hygiene Sections and sprayed all habitations on the axis of advance. In 1944 there were 14 teams under Army control; in 1945 there were 24. A sanitary assistant of the Field Hygiene Section supervised their work locally, but the A.M.C.U. officer was charged with the duty of co-ordinating their activities and maintaining close liaison with divisional staffs.

(c) D.D.T.-spraying A.M.C.U.s were distributed across the front on a basis of two per division. They followed up the work of the flysol-spraying teams, covering an area extending to 3 kilometres on either side of the axis. They were placed under the immediate supervision of two officers from the malaria field laboratories, who visited them frequently, checked the results of their work and (to ensure flexibility under rapidly changing conditions) moved them as necessary without prior reference to Army H.Q. Each house as it was completed was marked with the letters "D.D.T.", the number of the A.M.C.U. and the date.

This scheme worked admirably. In April, 1945, the A.M.C.U. system was replaced by a Malaria Control Company on a new establishment, but the method of operation remained essentially the same. It had the enormous advantage over the original system of divisional A.M.C.U.s (in which each Unit could be employed only in the area of its parent formation) that it was an easy matter to concentrate the total potential on the parts of the Army area which most required control. Polish and New Zealand A.M.C.U.s were not included in the scheme, with the result that they frequently expended energy and materials in non-malarious areas.

It was a pity that the Westinghouse Aerosol Bomb and the Insecticidal Sparklet did not become available until the greatest need for them was past. Unit mosquito squads were supposed to carry out twice-daily spraying within unit lines, using hand guns and anti-mosquito spray, but it is doubtful if this was ever done in an effective manner. The Aerosol Bomb is so simple to

operate, and so much more likely to be used, that it seems the complete answer to the problem of inducing unit squads in forward areas to concentrate on adult destruction.

Air larviciding was first employed in Sicily in the Lentini area; later it was used in many parts of Italy, including the Pontine Marshes, Cassino, Lake Trasimene, and the canal systems near Perugia and Arezzo; but these operations were insignificant compared with the programme for the Lombardy Plain offensive in 1945. This included the use of both paris green and D.D.T. Planning was based on an empirical figure of 30,000 acres which might require treatment, half with paris green and half with D.D.T. A storage and loading depot was established on Rimini airfield, which included three large tanks with a total capacity of 9,000 gallons connected by a pipeline to a feed pipe near the runway. The D.D.T. solution was mixed by hand in 44-gallon drums, pumped into two small (300-gallon) tanks where solution was completed, and run by gravity into the storage tanks. Paris green and diluent (powdered cement) were mixed in a machine constructed for the purpose by a technician in a soup-powder factory at Cesena, put up in stout half-hundred-weight paper bags and loaded into the aircraft by hand. This depot was capable of dealing with 10,000 gallons of 5 per cent D.D.T. solution and 20 tons of 25 per cent paris green weekly. (The strength of the paris green mixture was later reduced to 15 per cent as a result of ground checks.) The aircraft were Bostons and Stearmans, flown by American pilots under the direction of a malariologist (Major H. G. Aitken, U.S. Sanitary Corps) in collaboration with the O.C., 8 Malaria Field Laboratory (Lieut.-Colonel D. N. Keys). The pilots were extremely keen and the organization worked without



FIG. 1.—Mixing and Storage tanks for D.D.T. solution. Rimini Airfield, 1945.

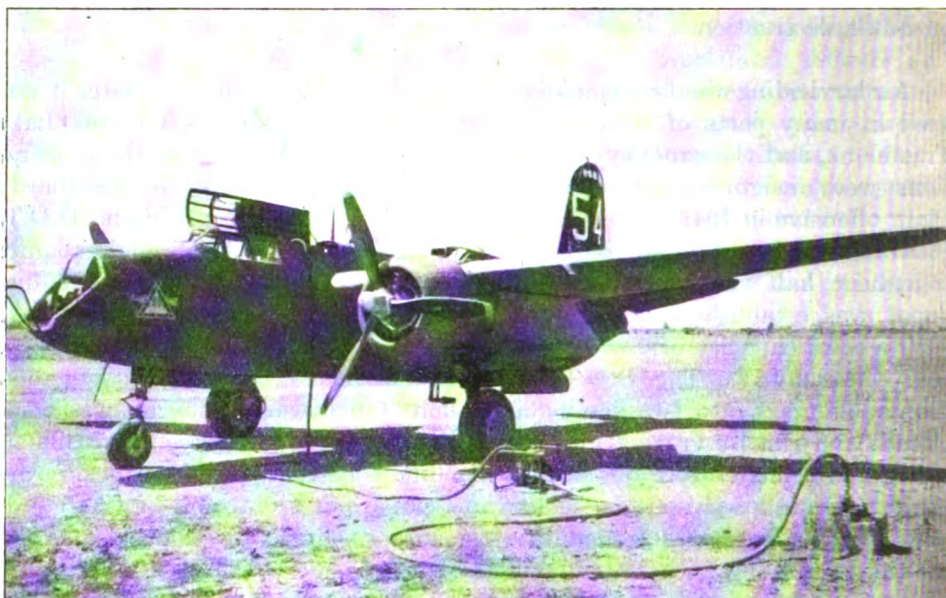


FIG. 2.—D.D.T. solution piped to runway and pumped into aircraft. (Note small Venturi spraying tube.)

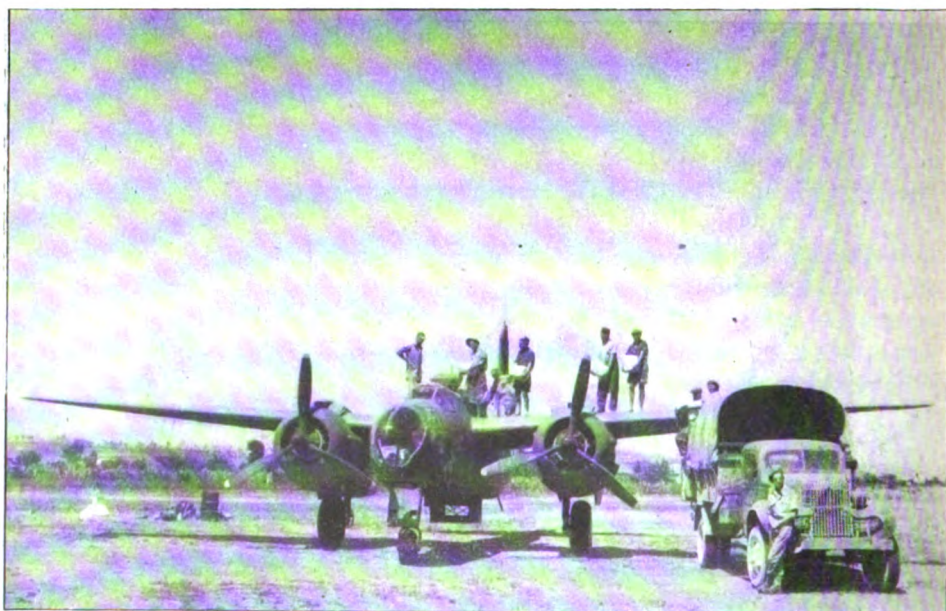


FIG. 3.—Hand-loading Boston with 15 per cent paris green. (Half-hundredweight paper bags. Note Venturi tube.)

a hitch. In the first five weeks of the season they laid down about 30 tons of paris green mixture and 50,000 gallons of D.D.T. solution.

The keenness and ability of the pilots were so great that one hesitates to make any comment on air larviciding which might be construed as a criticism of their skill. Treatment by means of aircraft is so spectacular, however, and so simple to lay on, that as a weapon against malaria it is liable to be misapplied. The number of areas really suitable for air treatment is limited, and great care in selecting sites and frequent ground checks are necessary if it is to be employed to full advantage. The following is quoted from a report by the present writer :—

“The distance from Rimini airfield to Nonfalcone or Palmanova is about 130 miles as the Boston flies, and the weather conditions on the area to be treated may be quite different from those on the airfield when the pilot takes off, particularly in this part of Italy which is notable for its localized rainstorms. On the morning of June 18, the A.D.H., Eighth Army, happened to be at Palmanova when a Boston came over and attempted to treat the moat with D.D.T. in oil. There was a strong east wind, the moat twists between high steep ramparts, and on the side of the town which the pilot was attacking there are many wires which make low flying dangerous. The plane roared low down over the ramparts at about two hundred miles an hour spewing a yellow cloud of oil on the wind, wheeled away, circled, roared down again, and so on in a series of spectacular dashes which must have thrilled the onlookers ; but to one of them it was a most depressing sight. On this occasion at least the pilot risked his life in a gallant but almost completely unsuccessful attempt to do what might have been done with perfect ease and accuracy from the ground. Enquiry elicited that the O.C., Mal. Fd. Lab., did not consider the moat at Palmanova suitable for air treatment, but had been assured that the pilot was satisfied that he could do it.”

Before leaving the subject of aircraft, the importance to the malariologist of reconnaissance from the air should be mentioned. A light aircraft (the Fairchild is very suitable) should always be available in malarious country, and would be particularly valuable if fitted for the paris green dustings of small inaccessible areas.

TRAINING AND PROPAGANDA.

A vast amount of training was carried out during the campaign at the C.M.F. School of Hygiene, at Field Hygiene Sections and Malaria Field Laboratories, by pathologists in mobile bacteriological laboratories and hospitals, and by regimental medical officers.

In the early days formal training showed the usual tendency to lag behind development in the field. This was particularly noticeable in the case of A.M.C.U. personnel. To quote Lieut.-Colonel J. Morgan, *O.B.E.*, *I.M.S.* (May, 1944) :—

“In training A.M.C.U. personnel less stress must be laid on physical measures of control. To be stressed should be the *urgency of establishing initial control* by adult destruction and chemical larvicide application. These things must be carried out with all speed on entering a zone. And the first of these is *always* adult destruction. A typical programme of an A.M.C.U.

as at present trained is—1st day : choosing a site and getting another unit to which it can attach itself ; 2nd day : dipping for larvæ and looking for adults ; 3rd day : establishing liaison with formation and surrounding A.M.C.U.s, etc. They must be taught that their job is *immediate* control. With only one or two exceptions the A.M.C.U.s might to all intents and purposes be a collection of quite untrained personnel. In fact, it might have been better had they been so.”

Individual training was on the whole very successful. The standard of personal prophylaxis bore testimony to this. The one measure which teaching universally and completely failed to put over was the use of repellent. To the end of the campaign the prejudice against repellents remained unshaken ; it amounted, indeed, to more than mere prejudice ; it was a complete lack of appreciation, a rooted and scornful distrust. The average soldier simply did not believe in the necessity for a repellent or that the stuff he was given was of any value, and the majority of officers might have been unaware of its existence. There was something wanting, some fundamental error, in the whole of our teaching about this particular precaution ; but one cannot help feeling that there may have been factors involved to which the psychiatrist might have been able to supply the clue.

A great deal of propaganda was devoted to mepacrine, and in the second and third seasons it was obvious that the vast majority of troops were mepacrine-minded and took their daily tablet regularly. In some respects propaganda showed too strong a bias towards suppressive treatment, producing an impression that this was the most important aspect of malaria prophylaxis. By the third season mepacrine was so firmly established in popular favour that not only formation staffs, but a proportion of the rank and file, wanted to commence it sooner and continue it longer than the dates given by higher authority. .

Pure propaganda about malaria, as distinct from teaching, may be directed towards one or both of two objects :—

- (a) Generally impressing on the soldier the necessity for taking precautions.
- (b) Commending to his favour particular devices or courses of action, e.g. the Flit gun, care of the mosquito-net, the wearing of slacks in the evening.

The first is infinitely easier than the second, and the sign “ This is a Malarious Area ” was probably as effective in this regard as the most elaborate poster. In general, it may be said that propaganda of the first type was well done and generally effective ; of the second it was poor. Many of the official posters were ugly and undistinguished, comparing very badly with, say, beer propaganda in civil life, and most of those produced by field hygiene sections showed more enthusiasm than inspiration or artistic ability. There were notable exceptions : the excellent official productions by Hopper, for example, and the wall paintings, well placed and brilliantly executed, carried out in the forward areas by a certain Pte. Goodale of 2nd Cdn. Fd. Hyg. Sec. in 1944. Honourable mention is also due, perhaps, to the famous life-sized poster at Anzio of “ Jane ” (surely the least malaria-minded of wartime personalities !) which had to be removed because it stopped the traffic.

Health weeks were organized by A.F.H.Q. in the second and third seasons, in which education officers of all formations collaborated with the Medical

Services and malaria was given special attention. The first, in 1944, was extremely successful. The second came just after the close of hostilities and was handicapped by the prevailing feelings of reaction. In the Eighth Army two Hygiene Exhibitions were held which evoked an astonishing amount of interest from the troops. The 1945 exhibition was open for six days and was seen by about five or six thousand every day, many of whom waited cheerfully in queues for nearly an hour to get into the model tents. The malaria exhibits attracted a degree of interest which caused surprise, as there had been a feeling that the troops were "getting browned off" with incessant malaria propaganda. This was patently not the case. To the end of the campaign it was constantly found that teaching about malaria, if properly presented, was well received.

EPISODE AT MONTE SAN BAIGIO.

At the end of July, 1944, an incident occurred which demonstrated in startling fashion the danger of relaxing malaria vigilance in Italy. It was an object lesson so striking that it produced a salutary effect on anti-malaria discipline generally, and may possibly have conferred more benefits in the long run than the injuries it inflicted at the time.

The 56 (London) Division disembarked at Taranto on July 17 after a short spell in Middle East. Between July 21 and July 28 they moved to Tivoli.

At the end of the first week in August their malaria figures rocketed; from a level of 30 to 40 cases per week they shot up to 344 cases in the second week in August, followed by 119 the next week, and dropping back to 44 cases the week after. The peak was on August 9, when 64 cases were admitted, and the incidence for that week was equivalent to 984 per 1,000 per annum.

The source of the outbreak was not difficult to trace. An advance party of 1,000 which detrained at Itri produced no cases of malaria. The remainder of the division were to have gone by train as far as Palestrina, north of Rome, but, at the last moment, the insecurity of a tunnel caused Movement Control to alter this, and the division left the train at Monte S. Baigio in the marshy district north-east of Tarracina, in one of the most celebrated haunts of malaria in Europe. They remained at the station for upwards of three hours before leaving in M.T. for Tivoli.

The journey from Taranto took about forty hours. The trains were very crowded, with up to 40 men and their personal kit in box trucks. It was impossible to use mosquito-nets. The journey was very slow, with many halts, and in the final portion, through the marshes, swarms of mosquitoes invaded the train and men were bitten both by day and by night. At the station itself there was an obvious mosquito nuisance.

About half of the division detrained at night. As each train arrived "medical instructions emphasizing the highly malarious nature of the area and detailing full malaria precautions were handed to the O.C. and M.O." Their grateful comments are not recorded.

After full investigation the Consulting Malariologist (Brigadier G. Macdonald) was satisfied that the outbreak could not be attributed to a medical breakdown. Mepacrine was commenced on June 21, and "full precautions" were ordered for the journey from Taranto; these comprised

daily mepacrine, clothing precautions, and the use of repellent. Mark II cream (pyrethrum type) had been issued in Middle East. Failure could be traced, as usual, not to any fault in the arrangements, but to the manner in which they were carried out.

With two exceptions units which arrived at Monte S. Baigio by night had more cases than those which arrived by day. These exceptions are interesting :—

167 *Field Ambulance*.—This unit had only one case in the second week in August. “Mepacrine and repellent supervision were of the highest order. At each stop during the night officers and N.C.O.s carried out an inspection of clothing and satisfied themselves that repellent was being used.”

100 *Lt. A.A. Regt.*—This unit (strength 1,100) had only 9 cases in the week in question—i.e. about half the incidence in that week for the whole division. “At Taranto all three batteries were given a talk on malaria precautions by the M.O. To ensure that all men attended the lecture other duties were held up by the O.C. The O.C. also held a conference of all battery and troop commanders in which the importance of anti-malaria precautions was emphasized. . . . Nevertheless, though clothing was supervised on the journey, mepacrine and repellent were not.”

Throughout the division generally, however, investigation showed that precautions had been lax. Mepacrine had not been properly supervised, and with the single exception mentioned above the use of repellent had not been enforced ; indeed, in some units it was not even issued to the men until they arrived at Tivoli. The Consulting Malariologist made the following comments :—

“Under intense anophelism such as was encountered it (i.e. Mark II cream) might be 100 per cent effective for a short period only, one to two hours. There may have been difficulties in application under the very crowded conditions, and great heat may have caused sweating that tended to wash it off. Despite these drawbacks, which might have limited its value, I consider that regular use by all ranks throughout the journey would have prevented an outbreak of this size.”

The crux of the matter was, of course, that Movement Control had taken it upon themselves to alter the detraining station to a place which would not have been selected by anyone who understood the realities of the malaria situation. Nevertheless, even without this alteration cases would still have been caused by mosquitoes entering the train as it pulled slowly through the marshes, especially at dusk or at dawn. The same conviction arose in the minds of everyone who read the story of the outbreak : any division in Italy at that time might have fared as badly, and the standard of prophylaxis generally must be tightened up.

THE PLAINS OF LOMBARDY, 1945.

When the Anzio beach-head at last burst open at the end of May, 1944, the malariologists sighed with relief, and switched their attention to that north-eastern corner of Italy where malaria has been rife since time immemorial.

In July a letter was circulated to all medical officers in the Eighth Army,

informing them that "Professor Missiroli, the eminent Italian malariologist, had expressed the opinion that the Ravenna plain was now probably more malarious than the Pontine Marshes." A second letter issued to all formations two days before the assault on the Gothic Line (August 25) contained the following warning :—

"Almost the entire valley of the River Po is malarious. . . . Under war conditions the risk will undoubtedly be greatly augmented by several factors, amongst them deliberate flooding. It is probable that this will be carried out by the enemy with the advice of competent malariologists with the intention of increasing malaria as well as mechanically obstructing troops, as has already occurred elsewhere in Italy. Until precise information is gained by survey after occupation it should be assumed that the whole valley north of the Rimini-Bologna road is extremely malarious, with a risk equal to or greater than that encountered in Sicily, in the Lentini plain, in 1943."

The advance was less rapid than was expected. Ravenna was not captured until the beginning of December, and the season was over before any considerable number of troops had entered the danger zone. The malaria organization had been granted a breathing space.

The interval was not wasted. General propaganda and training were purposely withheld until the spring, in order to get the maximum response from an intensive drive at a time when the danger was less remote, but courses for junior medical officers and malaria staff officers were held during the winter, the training of unit squads commenced in February, and malaria control personnel were given a refresher course lasting for two weeks in March. The Italian combat groups which came under command received special attention, as they presented both an immediate problem in sanitation and a threat for the future, on account of the enormous number of gametocyte carriers amongst them.

Nearer acquaintance with the Lombardy Plain did nothing to allay the anxiety of the malariologists. In the area already occupied there was a considerable amount of flooding, and air photographs showed a great deal more ahead; and it would be an easy matter for the enemy to put vast areas under water by blowing the dykes farther up the Po Valley. The experts made gloomy prognostications about the possibility, if this happened, of the rapid spreading westwards of *A. sacharovi* (*elutus*) from the saline marshes near the sea.

The propensity of *elutus* to bite by day was used as a weapon of medical diplomacy to such effect that when the 1945 season opened the Army Commander ruled that shorts would not be worn in the Eighth Army except for organized recreation. Quite apart from the improvement in individual protection which this order conferred, it had the advantage of impressing on the minds of all ranks the fact that there was an unusual malaria risk that season. It was gratifying to overhear references in the Mess to the ferocious mosquito of the Po Valley.

Transmission was not expected to commence until early in May and active breeding was unlikely before the middle of the month. The arrangements for spraying and aircraft control have already been described. D.D.T. spraying was started on March 18, working first along the main routes in the worst areas, with the object of destroying as many hibernators as possible.

Flysol spraying was to commence on May 1, with a total of 24 teams, the personnel of which were used prior to that date to augment the D.D.T. programme. This, as it turned out, was a mistake; it would have been better to employ both methods from the beginning, when the greater rapidity of flysol spraying would have achieved a wider slaughter of hibernating mosquitoes. When the big offensive began the flysol teams were got on the road as quickly as possible and all were functioning before the end of April. Aircraft larviciding commenced on May 15, although little evidence of breeding was found before the end of the month.

The Eighth Army flung itself into its last battle on April 9, and in twenty-three days the campaign in Italy was over. The speed of the advance made it utterly impossible for the spraying teams to keep pace with the forward troops, but they did their best, and the main routes were covered long before large-scale transmission could have commenced. Four British detachments, each equivalent to two Malaria Control Units, were employed on D.D.T. spraying, in addition to the Polish and New Zealand units which worked independently. It was found that one detachment using Knapsack and Pressure (Four Oaks Kent type) sprayers and employing about 100 labourers could spray about sixty farms daily. Over a thousand gallons of D.D.T. solution were used in the Army area every day.

Immediately hostilities ceased it became possible to arrange for most units to be sited outside the more dangerous regions and concentrate the spraying organization on the parts of the "red" area which were still occupied. When, towards the end of May, the D.D.T. programme was completed, all detachments were switched to larval control. The combined attack on these danger spots by D.D.T. spraying and larval control from the air and on the ground was so successful that in the extremely dangerous coastal sector near the mouth of the Isonzo, for example, where for political reasons certain elements of 13 Corps had to remain, the mosquito population virtually disappeared and the malaria rate remained consistently low.

The final battle of the campaign was over before the malaria season was properly started, although *clutus* in its uneasy hibernation in farms and outhouses claimed some victims. The extra-regimental spraying organization was put to the test of a mobile battle, the ability of the soldier to protect himself was not. When full precautions were instituted it was found that the standard was generally very high, but it must be acknowledged that in the third season in Italy no troops were ever exposed to anything comparable to Sicily in 1943. The malaria risks were probably not as great; the difficulties certainly bore no comparison.

SUMMING UP.

The tragedy of preventive medicine is that its failures are obvious; success can never be proved. Failure has been given prominence in this account, because by such acknowledgments we learn; but those who took part in the campaign and were competent to judge must have realized how much was achieved. To demonstrate it mathematically is another matter. We know what the casualties were; we do not know what they might have been.

Let us glance at the figures.

If we consider the whole Force, we recall that at the outset of the campaign the incidence in one particular week rose to about 410 per 1,000 per annum. In 1944 there were two weekly peaks in Italy, one in May, 150·62 (w.e. May 6) and one in August, 146·21 (w.e. August 12). In 1945, up to the end of June, the highest rate in any week was equivalent to 38·85 per 1,000 per annum.

In 1944 the incidence was over 100 per 1,000 per annum in eight weeks during the first half of the year, and four weeks in the second. In only four weeks during the first half of 1945 did the incidence rise to more than *one-third* of this figure.

Secondly, if we compare the incidence of fresh cases of malaria in the Eighth Army with battle casualties, we find that the ratio falls progressively from two to one at the beginning of the campaign to less than one in ten at the end :—

		<i>Malaria (Primary)</i>	<i>Battle Casualties (Wounded)</i>	<i>Ratio</i>
1943	3rd Quarter	12,532	6,415	2 : 1
	4th Quarter	4,178	8,637	1 : 2·1
1944	1st Quarter	901	3,500	1 : 3·9
	2nd Quarter	3,037	15,516	1 : 5·1
	3rd Quarter	3,288	19,975	1 : 6·1
	4th Quarter	927	10,995	1 : 11·9
1945	1st Quarter	365	3,679	1 : 10·1
	2nd Quarter	600	6,210	1 : 10·4

Finally, as a rough test of the efficiency of protective measures under field conditions at the end of the campaign, we may compare two similar formations of equal size, one in a non-malarious country (Austria) and one in an area which is in part very highly malarious (Venezia Giulia). From May 5 to June 23 the 5 Corps were in Austria and 13 Corps were exposed to malaria in Venezia Giulia ; yet their malaria figures were practically identical :—

	<i>5 Corps Austria</i>	<i>13 Corps Venezia Giulia</i>
Malaria " Fresh "	111	121
Malaria Relapse	122	113
Total	233	234

In the middle of the period in question 5 Corps had discontinued mepacrine and the majority of their " fresh " cases were due to a break-through of previous infection. This comparison indicates that a formation can be kept in a malarious zone in June without any increase in its malaria incidence over what it would have shown in a non-malarious country. (The average weekly rate in this case was 0·44 per 1,000 per week.)

It has not been possible in this brief sketch to pay tribute to the many hundreds of workers throughout Italy whose efforts contributed so largely to the wellbeing of their comrades, and only passing mention has been made of the most important factor of all.

The control of malaria in war can never be perfect without the informed and intelligent co-operation of the individual soldier. The most elaborate schemes cannot protect him if he will not protect himself. Discipline alone is not enough. What matters is his response when he is not under supervision ; not the disciplined observance of rules, but action based on knowledge and understanding and a sense of personal responsibility.

What we are trying to protect, and the most important material we have to work with, are the same ; not a Force, or an Army, or "The Troops"—but MEN and it is only by considering them as men that we can hope to conquer malaria in the field.

For the foe is not just an organism or an insect. It is wily Nature herself, in all her complexity.

" If you would see all of Nature gathered up at one point, in her loveliness, and her skill, and her deadliness, and her sex, where could you find a more exquisite symbol than the mosquito? "

THE WORK OF A CORPS PSYCHIATRIST IN THE ITALIAN CAMPAIGN.¹

BY

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ENCOUNTERING THE PROBLEM.

WHEN a psychiatrist was attached to each of the three British Corps invading Italy in September, 1943, no one was quite sure what their functions would ultimately be. Not altogether unwisely, they were sent into the field to build up the job for themselves.

The writer landed with Tenth Corps at Salerno towards the end of September, carrying on his back a minimum of personal kit and 1,000 tablets of phenobarbitone gr. i.

His first task was to check the evacuation to North Africa of minor psychiatric casualties from battle by providing treatment and disposal for most of them locally, thus avoiding secondary deterioration and curtailing the wastage of man-power. Necessity gave birth to improvisation and, in face of many obstacles, a forward psychiatric centre accommodating 50 patients was opened at C.C.S. level, precariously staffed by one or two borrowed nursing orderlies and a number of enthusiastic convalescents.

During this period the average stay of a patient in the centre could not be more than four days owing to the inflow pressure caused by the bitter fighting on and north of the Volturno. None the less, the proportion sent out of Italy was reduced to under 10 per cent (including a small number of psychotics). Some 30 per cent were returned to combatant duty with their original units and the remainder were re-allocated, by a somewhat rough-and-ready selection procedure, to less exacting employment on the line of communication.

The organization at this stage owed much to the work of Palmer [1], in Tripoli, though there were some differences in treatment.

Out-patients had to be seen and court-martial cases reported on ; minor administrative wars had to be waged over questions of personnel, transport, tentage and equipment. But all the time in the background loomed the greater problems : how to check the flow of patients at the source, how to create a wider understanding of the causes and mechanisms of psychiatric breakdown, how to come to grips with the basic factors which influence a man's capacity and will to fight ; in fact the whole positive side of a Corps psychiatrist's job.

It was necessary to go slowly at first, to allow time for people to get used to the presence of a psychiatrist in the Corps, and time for one's own greenness to wear off. But as more psychiatrists arrived in Italy the pressure of clinical work relaxed. It then became possible to visit infantry and other units and to stay with some of them for a few days. These contacts with combatant officers and men profoundly influenced the outlook of the writer on all problems of military psychiatry and, indeed, continue to do so.

FORMULATING BASIC CONCEPTS.

The Army psychiatrist must first know his Army, for his patient is the Army rather than the individual. Next, he must have a clear picture in his mind of what the ordinary soldier has to face and how he contrives to face it. Only when he has established his norms can he adequately assess the deviations from them.

¹Based on a Paper delivered in Rome before the Conference of Army Physicians, Central Mediterranean Forces, on February 2, 1945.

Moreover, the present environment of the individual patient is the Army at war and neither his past nor his future can be relevantly considered except in relation to this. Mentally, the psychiatrist, like every other soldier, finds himself in a new world with standards and values of its own.

Group Loyalties.—One must understand the framework of group loyalties in which the soldier works and fights, which holds him to his task or lets him go, and outside of which he is a lesser and more self-centred man than ever he is within it. To consider the individual soldier as an isolate, entirely detached from the group, is to pave the way both for erroneous theories and for unwise decisions. Every fighting Service evolves a structure of group loyalties peculiar to itself, conditioned by the nature of its task.

It is on the development of these group loyalties that the effective integration and morale of services, formations, units and sub-units depends. Corps psychiatrists in B.L.A. [2] and Divisional psychiatrists in Burma [3] were fortunate, many of them, in joining their formations early enough to share in the morale-building process which goes on during the training period, before ever the troops are sent into action. This must have aided their work considerably.

Divisional psychiatrists enjoy a great advantage in that they are appointed to a formation which remains a constant entity. The Corps psychiatrist may be responsible for the mental health of two, three or even five divisions, yet knows that they are liable to be switched from his Corps to another at a moment's notice. This makes continuity impossible in a field where it is most essential to good work.

Concept of Mental Health.—Health may be defined as the capacity of an organism to function efficiently within its established environment. From the Army's point of view, a soldier is mentally in perfect health when his mind, undisturbed by distracting internal conflicts or by irrelevant external stress (e.g. domestic disharmony), is concentrated on the job in hand, with a positive determination to see it through, contributing all he can to the success of the enterprise. Such a man has achieved perfect adjustment to his new environment, the Army at war, and is thus able to function as a fighting soldier with complete efficiency. The whole of his innate capacity to withstand stress is free to meet whatever blows the enemy can hurl against him.

Adjustment of the usually peaceable citizen to life in a fighting Army is not always easily achieved. Anything tending to disturb this adjustment will correspondingly tend to disturb his mental health by creating emotional stresses which impede his efficiency. Morale, defined by Main [4] as "A conviction of personal power, competence and worth, animating a group in relation to the task in hand," is the corollary of mental health in the armed forces: it is the final expression of group integration and purpose.

Personal Adjustment and Unit Morale.—The factors which on the one hand promote and, on the other, disrupt the personal adjustment of the individual and the morale of the group within the Army are almost innumerable.

The former include, in the individual, a good personality, secure against its own internal stresses; a well-socialized outlook, not overvaluing the self and ready to endure hardship for the sake of others; a consciously held purpose in relation to the war, and a knowledge that he is valued by the group. In the unit as a whole they include good leadership, centring on an inspiring C.O., who in time becomes a kind of "father-figure"; intelligently directed training leading to clearly foreseen ends; sound motivation and a knowledge, widespread among the men, of the unit's task in relation to neighbouring formations; a feeling on the part of the men, fostered by efficient organization and good welfare, that their officers are concerned for their well-being.

Factors which influence individual adaptation adversely include home worries, separation from the group (through sickness, change of unit, etc.), wounding, unduly long service overseas—especially where these occur in a personality torn by deep internal stresses, poorly socialized or inadequately equipped to meet the changing demands of life in any sphere.

Adverse effects on unit morale may accrue from battle-weariness and hardship too prolonged; from the uncertainty bred by ignorance of what is going on; from unfulfilled promises and false rumours; from poor organization and leadership; from long periods of unrelieved idleness, in which frustrated aggression is misdirected upon those around or turned inwards in self-destructive depression.

Many more examples could be cited. Where the Corps psychiatrist discovers adverse factors at work which do not appear irremediable, he endeavours to persuade those concerned to appreciate the significance of those factors and do what they can to remove them.

WORK IN THE FIELD.

Charter of Duties.—The charter of duties of a Corps psychiatrist issued by the War Office in February, 1944, specified, among others, the following functions:

"To advise on all matters pertaining to mental health.

"To advise on the psychiatric aspects of morale, discipline and training, and by lectures and informal discussions with officers (staff, regimental and medical), assist in the promotion of mental health and preventive psychiatry.

"To visit medical units and regimental aid posts and advise on the management of psychiatric and psychosomatic problems.

"To keep himself informed of changing psychiatric problems during training and fighting periods with a view to the development of the mental toughness essential in fighting troops."

When, in the early summer of 1944, the Corps psychiatrist was relieved of direct responsibility for routine clinical work, he was able for the first time to concentrate on this prophylactic side.

Visits to Units.—Visits to combatant units are made for the dual purpose of gathering and distributing information. The psychiatrist's first contact is with the regimental medical officer, but when the opportunity is favourable he welcomes a chance of meeting the commanding officer and other officers. If the incidence of psychiatric casualties is lower than the average he will be interested to find out why this is so. If it is high he will seek possible explanations. These may lie in, for example, the exceptional conditions encountered, the loss of trusted leaders, or an unduly long period of continuous action.

The regimental medical officer may have problems of his own to bring up. The question, when should an unduly anxious man be considered ill enough to go to the psychiatric centre, is a perennial one with many aspects. Units are encouraged to handle their own minor psychiatric problems as long as they are able and willing to do so. The fate and progress of men returned to units from the Psychiatric Centre is of interest, and in the long run may have a direct influence on disposal policy. Queries may arise regarding the use of drugs. But the commonest question of all, on the lips of both medical and combatant officers, begins, "What would you do with a man like this . . . ?"

Discussion on more general problems relating to the minds of men at war tends to arise spontaneously in the evening hours. For this reason, one overnight visit is worth three at midday. Provided the psychiatrist is prepared to fend for himself, a visit paid while the unit is active is rarely unwelcome, and may be appreciated more than one when the unit is at rest. Indeed, the best way to learn an infantryman's background, or a trooper's, is to try doing his job for a few days.

Lectures and Conferences.—Conferences are held from time to time with, for example, the officers of a resting brigade. The Corps psychiatrist usually opens with a talk dealing, perhaps, with the management of men who appear liable to break down in battle or some other subject directly related to the everyday work of the company or platoon commander. The discussions aroused are often long and eager, ranging over a wide variety of topics, and the psychiatrist usually goes away feeling that he has learned as much as he has imparted.

Whilst it is the company or platoon commander who, by his control of the daily lives of his men, governs most directly their mental health, the influence of the regimental medical officer remains extremely important in prevention no less than in treatment. Medical officers are therefore encouraged to recognize the simpler psychological mechanisms underlying the reactions of members of their units and to study and practise what Maurice Levine [5] so aptly calls "minor psychiatry."

Meetings and discussions with other specialists and with the administrative staff of the R.A.M.C. are also desirable to stimulate an informed interest in psychiatric problems.

A periodic interchange of ideas with American and Canadian psychiatrists working in Italy has had valuable results for both sides, and it is profoundly to be hoped that this fruitful scientific liaison will continue after the war.

Advisory Functions.—Psychiatric advice has from time to time been sought or spontaneously offered on a great variety of special problems. Of these, absence without leave, compassionate postings, the optimum use of rest periods, rehabilitation training, and post-hostilities planning are examples. There are indeed few problems involving human beings which have not some psychological aspect.

Though the Corps psychiatrist is responsible to the Deputy Director of Medical Services of the Corps, his work involves constant consultation with the Adjutant-General's Branch and its Welfare, Education, Legal and Chaplains' Sub-Branches.

CONCLUSIONS.

The Corps psychiatrist, in addition to supervising the management of psychiatric casualties, has many other functions designed to reduce the incidence of breakdown and to maintain the morale and efficiency of the troops. His usefulness varies directly with his own capacity to adapt, his willingness to learn and the extent to which he can identify himself with the basic aims of an Army at war. It also depends on his ability to get on with combatant officers and men and to offer technical advice under the guise of "plain common sense" (or, sometimes, plain common sense under the guise of technical advice!).

While making full use of his professional training, he must keep both feet firmly planted in the real situation, which is the Army as he finds it. He must indeed feel himself to be genuinely part of that Army and not an outsider, looking on.

In military matters the professional soldier is supreme because, in the highest grades at least, his professional knowledge and skill are second to none. It is part of the job of the Army psychiatrist to interpret for him his attitudes and trends of thought which may affect the morale and fighting efficiency of his men.

Deeper questions remain in the background, to be pondered later. This article speaks only of some of the problems which one Corps psychiatrist encountered and of some of the things he tried to do. Needless to say, he ends it wishing in retrospect that he had done them better.

ACKNOWLEDGMENTS.

Grateful acknowledgments are proffered to Lieutenant-Colonel S. A. MacKeith, R.A.M.C., late Adviser in Psychiatry, A.F.H.Q., for his continual help and encouragement; to Brigadier E. M. Townsend, D.D.M.S., Tenth Corps, and Major Ian Lewis, late D.A.A.G., Tenth Corps, for active help in carrying out this work; and finally, not least, to Lieutenant-General Sir Richard McCreery, K.C.B., etc., late G.O.C., Tenth Corps, for his constructive understanding of the problems discussed in this paper.

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PYOGENIC INFECTION AS A COMPLICATION OF ISCHÆMIC NECROSIS OF MUSCLE.

A REPORT ON THREE CASES.¹

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THE following three cases of pyogenic infection supervening on ischæmic necrosis of muscle are presented. In the limited literature at our disposal we have been unable to find any reference to this condition.

These three cases had all been wounded in battle and had received treatment in a forward area before arrival at this hospital. In each case there had been arterial damage in the proximal segment of the limb followed, after an interval, by massive necrosis and infection of groups of muscles in the distal segment of the same limb. In none of these cases was there any evidence of gas gangrene, nor was the skin involvement as extensive as the infection of the underlying muscle. All cases resembled an advanced stage of an ischæmic necrosis of muscle on which pyogenic infection, instead of the usual fibrosis, had supervened.

CASE REPORTS.

Case 1.—Havildar M. H., Indian Army. On March 29, 1944, this soldier received a grenade wound of the left arm. The wound of entry was on the lateral aspect of the arm just proximal to the elbow-joint; there is no record in his notes of any wound of exit. He also received a small wound on the anterior aspect of the forearm just proximal to the wrist. These wounds were excised and a counter opening made on the medial aspect of the elbow-joint. Plaster of Paris was applied from the upper arm to the knuckles.

¹When considering the early treatment of these cases it should be borne in mind that they were wounded in battle in the Burma jungle under conditions where emergent treatment only was possible.

A more detailed account of the exact arterial damage would have been valuable but it was quite out of the question to work this out under the existing conditions. Nor was it possible to identify the causal organism by culture. Appearances did not suggest an anaerobic streptococcal infection which, indeed, would have appeared earlier.

In all cases there was devascularized muscle going on to necrosis; any organism present would attack this and it is surprising that *Clostridia* appear to have been absent. A staphylococcal infection appears the most probable. The third case is most creditable.

A similar case was dealt with by Monro and Slessor. In this, four hours after wounding, there was a well "set" ischæmic contracture with much pulping of triceps and biceps. When straightening the fingers considerable force was required. At a subsequent nerve suture operation a greenish exudate was expressed from damaged muscle.

Ischæmic contracture was considered by Volkmann to be a true "rigor mortis" contrary to the view of Leveuf who regarded it as a secondary phenomenon. Herein it differs from the contracture seen in nerve injuries. This means that when contracture occurs early immediate exploration of injured vessels is essential.

The green exudate which appears in established cases of Volkmann's contracture has been mentioned by Griffiths and (?) Thomas but the cause remains uncertain—it may be altered blood pigment.—ED.

Immediately after wounding he could move the third and fourth fingers of the hand. Three days later the fingers had swollen and there was apparently a complete paralysis. On April 3 there was complete loss of sensation in all his fingers, and on the 15th the wound was re-dressed with vaseline gauze and the plaster reapplied. Two days later, on the 17th, the plaster was uncomfortable and he had pressure symptoms in the fingers. On April 30 the plaster was removed and an X-ray examination on this date showed a fracture of the lower third of the humerus just too high to be a true supracondylar fracture. There were several small metallic foreign bodies present. On May 3, when the plaster was removed, there was a small wound with pouting granulations on the lateral aspect of the lower part of the arm and there was a large sloughing wound on the anterior aspect of the forearm at the junction of the middle and upper thirds. The slough was excised and the cavity drained by a counter incision.

He was admitted to this hospital on May 10, 1944. From the 10th to the 16th he had considerable pyrexia and on the latter date the hand became swollen. The next day the arm proximal to the plaster showed numerous blisters and the plaster was removed. On the anterior aspect of the forearm there was a large sloughing area of skin, of muscle which was necrotic, yellowish in colour, did not react to stimuli and was bathed in pus. On the posterior aspect of the arm just above the elbow a similar wound containing a pocket of pus was found and drained. There was considerable hæmorrhage from the latter cavity but it was controlled by packing with vaseline gauze and a fresh plaster was then applied. One pint of whole blood and one of glucose saline were administered and sulphathiazole medication commenced by mouth. The hand remained swollen and on May 19 when the dressings were reapplied the ulna was seen exposed and bared of muscular attachments. Not to embarrass the circulation any further, Cramer wire was substituted for the plaster case. On the 23rd there was commencing gangrene of the finger tips and on May 25, as the skin infection of the proximal segments of the limb had cleared, it was decided to remove the arm. Under ethyl chloride and ether anæsthesia, an amputation through the middle of the shaft of the humerus was performed. Equal antero-posterior flaps were made, and were loosely sutured over a roll of vaseline gauze. Towards the end of the operation the patient developed ether convulsions which were easily brought under control by the slow injection of 2 c.c. of 5 per cent pentothal sodium solution. During the operation he received one pint of reconstituted plasma and 22,000 units of polyvalent anti-gas-gangrene serum. Next day the pulse and temperature were normal and on June 7 the wound was healed.

Examination of the amputated limb showed that all the muscles distal to the fracture of the humerus were dead, whereas the skin between the abscess cavities was healthy. The primary infection seemed to be muscular, with sloughing and abscess formation and secondary involvement of the skin. The bifurcation of the brachial artery was abnormally high in the arm, and the radial and ulnar arteries were small and contracted. The forearm was a bag of pus containing gangrenous muscle.

Case 2.—Sepoy C. K., Indian Army. This soldier received a gun shot wound in the region of the left elbow on May 4, 1944. The missile entered on the medial side of the arm one inch proximal to the elbow-joint and there was a large wound of exit on the lateral aspect of the lower part of the arm. There was profuse hæmorrhage at the time. Next day he was admitted to a field ambulance. He was severely shocked and after resuscitation an X-ray examination revealed a comminuted fracture of the lateral condyle of the humerus, and a fracture of the upper end of the ulna with upward, forward and lateral displacement of the distal part of the ulna together with the radius. Débridement of the exit wound was carried out and it was observed that the brachial artery had been severed. The wound was powdered with sulphanilamide, packed with vaseline gauze and the limb immobilized in plaster. On May 7, as the plaster was tight and very blood-stained it was removed and the arm placed in a sling. Next day he developed a mixed infection of "benign" and "malignant" tertian malaria. On May 11, he had cellulitis around the wound of entry; an incision extending up the medial aspect of the arm was made. A large collection of sero-sanguineous pus was evacuated and at the same time detached fragments of the lateral condyle of the humerus were removed. A plaster was applied and a course of sulphanilamide by mouth was commenced.

He was admitted to this hospital on May 13. He was seriously ill, the hand was swollen and a patch of cutaneous gangrene was seen at the proximal part of the thenar eminence.

Gas gangrene was suspected and the plaster was removed. An X-ray photograph was taken. A large pocket of what looked like gas was seen around the lateral condyle of the humerus. A drip saline containing 50,000 units of polyvalent anti-gas-gangrene serum was started, and under pentothal anæsthesia the wound was explored.

The pocket of "gas" corresponded to a large tissue defect which was cleansed and enlarged to facilitate drainage. No evidence of gas gangrene was found. 5.05 grammes of 1:100 proflavine and sulphathiazole powder was applied to the wound and it was loosely packed with vaseline gauze. The arm was replastered in extension and kept elevated on return to the ward tent. Between the 19th and the 22nd of May he had 22 grammes of sulphathiazole by mouth, but he continued with remittent fever going up to 103° F., and a tachycardia of about 112 per minute. On May 18 the plaster was changed, and now the area of thenar-necrosis was much larger, extending up the forearm and exposing sloughing muscles and tendons. On the 26th he had swelling of the fingers and the plaster was split. On May 30 the patient's general condition had become very serious; his temperature was 105° F., and his pulse 130 per minute. It was considered that an amputation through the arm was urgently necessary to save the patient's life. This was performed under pentothal anæsthesia.

During and for three days after the operation one pint of blood followed by eleven pints of saline were given by intravenous drip. Over the same period he was given 220,000 units of polyvalent anti-gas-gangrene serum, and a further 20 grammes of sulphathiazole. For the first three days he had repeated rigors following the administration of the serum but after this his temperature fell to normal. His pulse-rate remained raised due to a severe secondary anæmia with a Hb. of 30 per cent, subsequently successfully treated by repeated blood transfusions.

The amputated arm presented on its volar aspect a large ulcer extending from the thenar eminence to the antecubital fossa, containing a mass of gangrenous flexor muscles bathed in pus.

Case 3.—Lance/Naik R. R., Indian Army. On May 11, 1944, this soldier received multiple grenade wounds of the lower extremities. He had multiple puncture wounds of both legs, the right thigh and a puncture wound on the medial aspect of the right knee from which a track led upwards and laterally. Later the same day there was some swelling around the knee and at operation a hæmatoma was evacuated and the puncture wound enlarged. The popliteal artery was pulsating but there was doubt about the circulation in the dorsalis pedis artery.

The other wounds required no operative treatment. The right leg was placed on a Cramer wire back splint. On May 12 the foot was warm although it was doubtful whether or not the dorsalis pedis was palpable.

On May 21 he came under our care. The wounds were healing; he had limited dorsiflexion of the right ankle but no cutaneous anæsthesia. X-ray examination revealed multiple foreign bodies in the lower half of the right thigh, in the lower half of the right leg and in the mid-third of the left leg. On the 27th Cramer wire back splint was replaced by a posterior plaster cast to maintain dorsiflexion.

On the evenings of May 29 and 30 he had high pyrexia but four-hourly blood smears were consistently negative for malaria parasites. Next day, the 31st, a diffused subcutaneous abscess of the anterolateral aspect of the leg was apparent and although the temperature had now fallen the pulse-rate remained raised. On palpation over the lower third of Hunter's canal a continuous thrill was felt, varying with systole and diastole, and on auscultation the typical "machinery murmur" of an arteriovenous aneurysm was heard. No expansile impulse could be felt. The thrill extended proximally as far as the junction of the upper and mid-thirds of the thigh and, distally, as far as the upper part of the popliteal space. Compression of the common femoral artery resulted in the disappearance of the thrill and produced a marked slowing of the pulse-rate. Dilated veins were seen under the skin in the lower part of the thigh and the knee. The upper part of the leg and the ankle were swollen and œdematous. A diagnosis of aneurysmal varix was made. A firm fibrous cord was felt in the popliteal fossa suggesting thrombosis of the popliteal artery. At, and below, this site there was no palpable arterial pulsation. The capillary circulation of the foot was present but sluggish. The abscess of the leg was incised under ethyl chloride general anæsthesia; a small

amount of pus was evacuated leaving a base of necrotic muscle. After operation he had a course of 30 grammes of sulphathiazole ending on June 4.

On the day following this operation, although the abscess was draining satisfactorily, he showed signs of severe toxæmia and his general condition was deteriorating. In the floor of the abscess cavity necrosed muscle was much more obvious; this muscle was pale yellowish in colour and had a peculiar fasciculated appearance as if a comb had been drawn through it. The pulse-rate was increasing, the thrill in the thigh was more pronounced and extended over a larger area, the œdema of the foot had increased and the circulation of the toes was causing anxiety. The likelihood of having to perform an amputation through the site of an arteriovenous aneurysm had to be considered. It was not a pleasant prospect. Alternatively we considered a disarticulation at the knee-joint in the hope that the aneurysmal varix would pursue the not infrequent course of resolution. On the following day, June 2, the patient's condition was worse. No evidence either clinical or bacteriological of gas gangrene was found. It was now evident that some serious operative intervention was necessary to save the patient's life. Three procedures were considered: (i) Amputation through the thigh after preliminary ligation of the femoral artery at the apex of Scarpa's triangle—the aneurysm would have made this a truly formidable undertaking; (ii) disarticulation at the knee-joint—this would have removed the cause of the patient's toxæmia but would have entailed a re-amputation at a later date; (iii) removal if possible of the necrotic muscle.

He was taken to the operating theatre with the intention of exploring the leg and if necessary doing a disarticulation at the knee-joint. Under ethyl chloride and ether anæsthesia an incision was made from medial to the head of the fibula to the centre of the anterior annular ligament at the ankle. This incision incorporated that already made for drainage of the abscess. For their full length the bellies of the muscle of this compartment of the leg were necrotic and floating in a sea of pus. A finger was hooked under them and by gentle digital dissection they were separated from their origin for their full length, the tendons being severed at the anterior annular ligament. The anterior compartment of the leg was thus cleared of all its muscle contents leaving the exposed surface of the tibia devoid of periosteum. Save for a skin vessel at either end of the incision there was practically no bleeding and no ligatures were required. The anterior tibial artery was thrombosed for its full length but the nerve showed no abnormality. The interosseous membrane was incised for a short distance, the muscle revealed and the peroneal group appeared normal. In view of this fact and in the absence of any evidence of cutaneous gangrene in the foot, it was decided not to amputate. The wound was powdered with 10·1 grammes of sulphathiazole and proflavine in the proportion of 100-1, packed with vaseline gauze and bandaged to a back splint. Next day his condition was much improved, his temperature and pulse-rate had fallen, the toes were warm and appeared to have an efficient circulation and normal cutaneous sensation in the toes was present. The extent of the thrill of the aneurysmal varix was much diminished. On June 6, when the dressing was removed, the wound was perfectly clean and dry; it was repacked with vaseline gauze and a long leg plaster applied.

One week later, in preparation for an X-ray examination, the plaster was removed and a large number of maggots was found inside. These were removed without disturbing the dressing. The X-ray examination revealed a small area of cortical necrosis of the mid-third of the tibia. The dressing was removed revealing a clean and healthy wound. Healthy granulation tissue was growing throughout the full length of the wound and in several places had encroached on the lateral surface of the tibia. The wound was repacked with vaseline gauze and another full length plaster applied. It was observed that the patient was able to perform slight dorsiflexion of the toes by contraction of the extensor digitorum brevis.

Histological Report.—Section of the affected muscle shows coagulative necrosis, the muscle fibres being in an advanced stage of hyaline degeneration. There is no evidence of any striation, nuclei are entirely absent and there is no cellular infiltration.

DISCUSSION.

"The effect of depriving a muscle of its blood supply is to cause a necrosis and the formation of a muscle sequestrum" [1].

Gas gangrene is the only condition of massive infective necrosis of muscle commonly described in which the importance of arterial damage as a predisposing factor is recognized.

It is quite possible, however, for temporary ischaemia in a limb to produce massive muscle necrosis because, whereas the skin can stand up to twenty-four hours' deprivation of blood supply without necrosing, muscle can only withstand six hours [2].

Volkmann's ischaemic contracture is the result of replacement by fibrous tissue of a muscle sequestrum resulting from ischaemia and it occurs not only in the upper limb but also in the lower limb [3, 4].

In the three cases described, instead of fibrosis, a pyogenic infection of the dead muscle occurred producing a slough. Gas gangrene was excluded by a careful clinical examination before operation, by examination and dissection of the specimen afterwards and by bacteriological and histological examination in one case.

In Case 3 both legs received almost identical multiple grenade wounds, but only the right side in which arterial injury of the proximal segment occurred showed muscle necrosis which was on an enormous scale.

In these three cases three types of arterial damage were seen. In Case 1 there was either contusion or compression of the brachial artery with spasm of the proximal parts of the radial and ulnar arteries. In Case 2 there was a breach of continuity and in Case 3 an aneurysmal varix and thrombosis. The usual sequelae following severance or sudden occlusion of an artery resulting in gangrene did not occur in these cases. On the contrary, the skin was only involved secondary to necrosis and suppuration of the underlying muscle, except in Case 1 in which gangrene of the finger tips occurred as a very late phenomenon.

Suppuration of muscle is a rare condition. It may occur by direct spread from neighbouring tissues when it is usually a staphylococcal infection. Streptococcal infection of muscle has also been described [5]. In this condition cutaneous erythema is marked and extensive and the muscle although discoloured is alive and reacts to stimuli. We have had personal experience of several cases of tropical pyomyositis [6], in which suppuration occurs in previously healthy muscle usually due to a mixed staphylococcal infection. In this condition, however, the infection is localized to a section of an individual muscle, unlike the cases under consideration.

The sequence of events is well shown in a case seen by one of us (K. F. H.) in England in 1940. A soldier sustained a compound supracondylar fracture of the humerus; the wound was excised, powdered with sulphanilamide, packed with vaseline gauze, the fracture reduced and the arm put in plaster with the elbow at a right angle. When seen in hospital two days later the fingers were acutely flexed and he was unable to straighten them. The plaster was immediately split, and the arm elevated; within a few hours the fingers could be extended. During the next few days the patient's condition rapidly deteriorated and on removing the plaster the forearm was seen to be red and swollen.

On incising the skin of the volar aspect, the flexor muscles fell out in a slough leaving the interosseous membrane bare. Amputation was eventually necessary in the face of an overwhelming toxæmia, and recovery occurred. It is impossible in this case to state whether the brachial artery had been compressed by the bone ends, by too tight a plaster or had gone into spasm as a result of the injury.

It is evident, therefore, that pyogenic infection of ischaemic muscle can occur. The condition is one of great severity for not only is the prognosis for the limb grave in the extreme, but the patient's life is in danger and an amputation may become an absolute necessity. This fact with our experience in Case 3 prompts us to recommend a filleting operation as soon as an incision has shown the presence of muscle necrosis, provided that only one muscle group is involved. If more than one group is involved then amputation is essential but, in one case at any rate, a limb has been saved by gentle removal of necrotic muscle.

CONCLUSION.

Infection by gas-forming organisms is not the only cause of massive gangrene of muscle. Pyogenic infection of ischaemic muscle produces a condition similar both in severity and prognosis to gas gangrene. The operative treatment of both conditions is very similar in that

a filleting operation or amputation is required. We would like to emphasize the generally recognized fact that all initial plasters enclosing the elbow and knee joints should be split, especially if the case is being evacuated to another unit. This should also be done in all cases in which arterial damage has occurred ; experience of war surgery emphasizes the seriousness of all arterial injuries to life and limb.

SUMMARY.

- (1) Three cases are described in which pyogenic infection of ischæmic muscle occurred.
- (2) The importance of arterial injury is stressed.
- (3) Attention has been drawn to the similarity of the condition to gas gangrene.
- (4) Operative treatment similar to that employed in gas gangrene is recommended.

We wish to express our thanks to the Director of Medical Services, India, for permission to forward this article, to Colonel R. P. S. Kelman, *T.D.*, *F.R.C.S.*, *O.C.* of the hospital, for much help and advice in compiling this article and to Major T. J. Eason, *F.R.C.S.*, *R.A.M.C.*, for access to Cases 1 and 2 which, during their stay in this hospital, were under his care.

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Current Literature.

STEPHENS, J. A. **Poisoning by Accidental Drinking of Trichlorethylene.**
[Memoranda.] *Brit. Med. J.* 1945, Aug. 18, 218-19.

Two persons were poisoned by drinking trichlorethylene in mistake for medicine.

A woman, aged 29, drank about $\frac{1}{2}$ oz. at 6.45 p.m. on September 25, 1944, and immediately spluttered, had acute lachrymation, sneezed several times, and vomited some water and whisky which was given to her. She rapidly lost consciousness and was comatose when visited by the author at 7.20 p.m. Her breathing was shallow but her pulse was of good volume; her pupils were widely dilated and did not respond to light. At 8.15 p.m. she recovered consciousness, vomited, and complained of frontal headache, but again became drowsy and remained so throughout the night. Next day she complained of abdominal pain and heaviness over the liver which was slightly tender but not enlarged. The urine was normal. Her headache persisted for four days and recovery was complete in 10 days.

The other patient, a man aged 47, took about 1 oz. from the same bottle at the same time, but felt no ill effects until 8.40 p.m., when he complained of feeling drunk and vomited copiously. He was found in a dazed, helpless state some time after 9 p.m. by his son, who gave him salt and water which produced further vomiting. He remembered nothing more until next morning when he still felt dizzy. He recovered in five days.

The author suggests that the delayed effect in the man might have been due to the fact that he drank about 4 pints of beer daily. [See also this *Bulletin*, 1943, v. 18, 139; 1944, v. 19, 283 & 619; 1945, v. 20, 87.] J. F. CORSON.

Reprinted from "Bulletin of Hygiene," Vol. 20, No. 11, 1945.

ASCHNER, M. & MAGER, J. **Evaluation of Materials for Louse Control.**
Ann. Applied Biol. 1945, May, v. 32, No. 2, 143-8, 3 figs.

Some laboratory methods are described by which various substances can be assessed for their value in louse control. Solids were tested by spreading on cloth or filter paper and confining lice on them. Liquids were tested by dipping the lice and afterwards removing the fluid by blotting. Vapour fumigants were tested by confining the insects in hermetically sealed vessels with blotting paper soaked in the substance under examination. In all cases the time of treatment was varied to obtain the minimum lethal exposure by which the efficacy of the material could be judged. Curves are given showing relation between concentration and lethal exposure time for certain substances.

Young stages of the lice were more resistant than adults; in some cases this was very marked. In addition, eggs were usually more resistant than larvæ, especially soon after hatching.

Among the liquids tested were: pyrethrum solutions, creosote solutions, kerosene and various organic solvents and alcohols. The solids included DDT, pyrethrum and creosote in talc and various organic compounds. Among the fumigants, ethylene dichloride was selected as being promising and was successfully used by a simple bin method in a field trial against body lice.

J. R. BUSVINE.

Reprinted from "Bulletin of Hygiene," Vol. 20, No. 11, 1945.

Correspondence.

ALLIED FORCES MASCOT CLUB.

TO THE EDITOR, "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS."

SIR,—May I ask your help in completing the records which the Allied Forces Mascot Club is compiling for the Imperial War Museum?

These records, which are considered absolutely unique, already contain the names and histories of some 3,000 animals and birds attached to the Allied Forces as Mascots and in some other official capacity.

Owing to the fortunes of war, such as frequent changes of address, and now through demobilisation, we have lost touch with some of our members, so their records are not completely up to date. We should welcome any further information about any members and it is not too late to enrol new ones among animals and birds still serving or which have served and which may have an equal right to go down to history with those already recorded in our files.

In certain cases posthumous enrolments can be made so that the names of animals which died on war service may be added to our Roll of Honour.

The Club records will eventually be housed in the Imperial War Museum, London, and the photographs of all winners of the Dickin Medal for Gallantry—the Supreme Animal and Bird heroes of the war—will shortly be on view there.

We shall be very glad to receive authentic stories of animals and birds which have played their part in the war, also photographs and snapshots.

Full particulars of the Club will gladly be sent on request.

We should like to thank all the Service men and women who have kept us so fully informed of our members in their charge and for the delightful letters we have received from them.

Yours truly,

14, Clifford Street, London, W.1.

February 19, 1946.

DOROTHEA ST. HILL BOURNE.

(*Secretary—Allied Forces Mascot Club.*)

Notices.

R.A.M.C. OFFICERS' ANNUAL DINNER.

THE Annual Dinner of the regular officers of the Royal Army Medical Corps, past and present, will take place on Friday, June 7, 1946, at Claridge's Hotel, Brook Street, W.1, at 7 p.m. for 7.30 p.m.

President: The Director-General, Army Medical Services.

It is particularly requested that early application for tickets be made. Seating accommodation, on this occasion, is limited to 200. If applications above this number are received a ballot for seats will take place on Friday, May 24. The cost of the Dinner will be 30s., a cheque for which amount must accompany the application. Wines, spirits, etc., will be extra and will be paid for at the table by those ordering them.

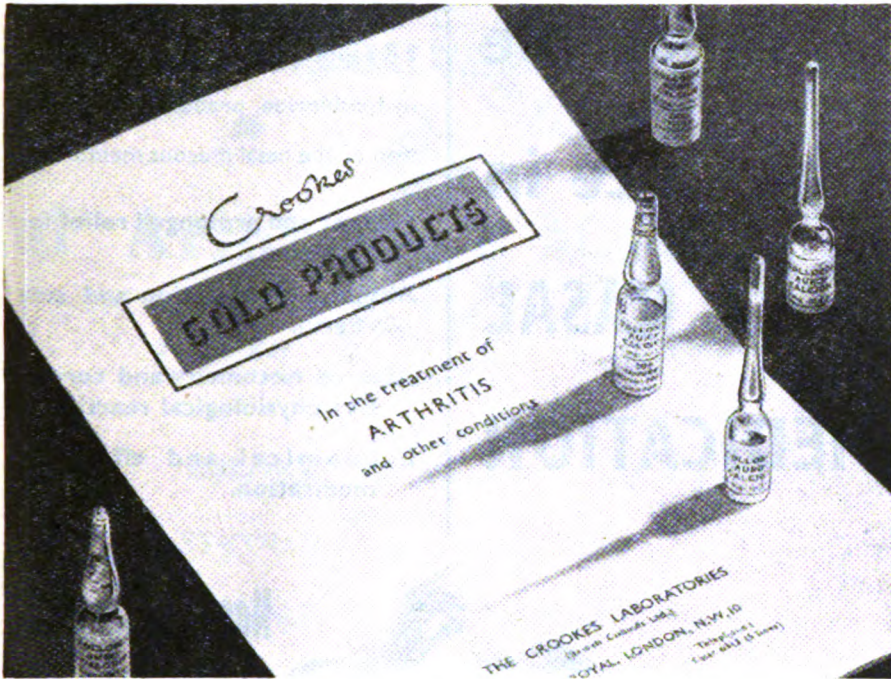
Dress: Service Dress, Dinner Jacket or Lounge Suit.

Applications for tickets should be made to the Honorary Secretary, R.A.M.C. Dinner Committee, 85, Eccleston Square, S.W.1.

ROYAL ARMY MEDICAL CORPS FUND AND R.A.M.C. OFFICERS' BENEVOLENT SOCIETY.

THE Annual General Meeting of the Subscribers to the Royal Army Medical Corps Fund will take place in the Library of the Royal Army Medical College on Friday, June 7, 1946, at 2 p.m.

The Annual General Meeting of the Subscribers to the Royal Army Medical Corps Officers' Benevolent Society will take place immediately afterwards.



A booklet 'Crookes Gold Products' which introduces their use in the treatment of Arthritis and other conditions is available upon request.

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confirm this. Collosol Auro-Calcium is a finely divided aqueous suspension of calcium auro-thiomalate prepared for intra-muscular injection. It is available as single ampoules and in boxes of six. 10 mg. in $\frac{1}{2}$ c.c. 25 mg. in $\frac{1}{2}$ c.c. 50 mg. in 1 c.c.

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Journal of the Royal Army Medical Corps.

Original Communications.

EDITORIAL FOREWORD.

WITH the exception of the introductory "The R.A.M.C. in Thailand," the following articles by Captain Markowitz and Major Hazelton were written whilst Prisoners of War in Japanese hands. Be it borne in mind that they were writing, and working, under what may euphemistically be described as adverse conditions without access to medical literature of any kind. No more need be said. The articles are published as written, with no editing, so that they may remain a permanent and vivid record of work done under such conditions. Further articles are under consideration and will be published either in the "Journal of the Royal Army Medical Corps," or elsewhere, as soon as is practicable.

THE R.A.M.C. IN THAILAND P.O.W. CAMPS.

BY

Captain J. MARKOWITZ,
Royal Army Medical Corps,

Eheu fugaces, Postume, Postume,
labuntur anni, nec pietas moram
rugis et instanti senectae
adferet, indomitaeque morti

HORACE.

THIS series of papers, written by lamplight in a jungle in Thailand, summarises certain experiences which we believe should be recorded as comprising one phase, possibly without precedent, in the activities of the R.A.M.C. This is not the place nor would it serve a useful purpose to relate how approximately 350 medical officers were captured with the defeated forces of Singapore and, instead of being released according to the Geneva Convention, were removed

and treated as ordinary captives. At first this caused resentment in our Corps but it was soon realised that our captivity was providential: great as has been the death rate from causes of one sort or another, every member of the Corps felt that these deaths would have been double or treble had we been separated from the troops.

These papers concern what happened to us that is worthy of note at Chungkai, Thailand. Doubtless others will have their experiences to relate. Chungkai was a jungle camp situated about 60 miles north-west of Bangkok on the Meklong-Quenol river. It was a camp for sick British and Dutch, and had a population of approximately 7,000. About 1,500 of the sick were entirely bed-ridden. The others, suffering from tropical ulcer, chronic malaria, etc., were able to walk and in part minister to themselves. The author arrived in May, 1943, functioning as surgical specialist and, later, as cholera officer.

He found the hospital denuded of medical and surgical supplies. Our pharmacist had a stock in trade which could be put in a doctor's handbag, excepting anti-malarial drugs which at the time were abundant. During our stay here it became essential to make certain improvisations. There was, for example, practically no morphia, practically no sulphonamide, and even sodium bicarbonate was lacking. Dressings were supplied every three weeks in quantities adequate for 50 sick. At first chloroform and ether were supplied meagrely; later the supply dwindled to a trickle that would suffice a reception station. Surgical supplies when we arrived were practically non-existent but we were able to scrape together a dozen Spencer Wells forceps and a few hypodermic needles of varying sizes. Even fuel was restricted and containers which could serve as sterilizers had to be scrounged. Such things as X-ray facilities, bacteriological aids, biochemical studies, the ordered panoply of an operating room, were not available. With our five senses and a minimum of supplies the R.A.M.C. at Chungkai and other places had to cope with epidemics of diphtheria, cholera and bacillary dysentery, and with the ever increasing and endemic presence of the avitaminoses, extensive tropical ulcers, amœbic dysentery, malaria in all its forms and such medical and surgical accidents as are not peculiar to the tropics, viz.:—appendicitis, intestinal obstruction, pneumonia, etc. At the time of writing these papers (November, 1943) there was an average of 10 deaths a day. The bulk of these were due to cerebral malaria, pellagra with beri-beri, tropical ulcer, debility and amœbic dysentery.

These observations were made in co-operation with Lieutenant-Colonel E. St. Clair Barrett, R.A.M.C., and Major A. L. Dunlop, R.A.M.C., who generously withdrew their names from the title page.

The author finds difficulty in expressing adequately his appreciation of the industry, resourcefulness and courage of the following:—Sgt. T. J. Steggall, S.S.V.F., Sgts. G. Backhurst and G. E. Holton, R.A.M.C., Ptes. G. W. Vaughan, R. J. Woolridge and W. Tolson, R.A.M.C. In the *Odyssey* one reads that Father Zeus takes away half of a man's virtues when he makes him a slave, and in looking around this prisoner-of-war camp one finds no difficulty in believing this statement. The author can only say that his associates must have been richly endowed.

THE R.A.M.C. IN THAILAND.

BY

Captain J. MARKOWITZ,
Royal Army Medical Corps.

In arduis fidelis.

“ Hot but not bothered.”

[Written at Sea on Board H.M.T. “Orbita,” October 18, 1945.]

If Bernard Shaw were requested to state what he thought of the way the Japanese treated their Prisoners of War, it is possible he would reply: “What did you expect, when for years the white race has been heaping indignities on the yellow men?” There can be no doubt that the Japanese had a long series of indignities to avenge. What the following strictly medical publications reveal is that they avenged them as much as they dared—on helpless prisoners. Others before in our history have been captured and reduced to servitude, or compelled to pull an oar in a galley (John Knox, for example). What is unique in our experience is not that, in the year 1942, we became slaves, but that we became the *slaves of slaves*. The wretched Koreans who lorded it over us were themselves confined and beaten by *their* masters, and whatever of venom and exasperation surged in their hearts they vented on us. It takes a slave to display arrogance, and to portray it in its quintessentialized form we suggest a statue of a Korean sentry, musket in hand, lording it over a squad of P.s.o.W.

Suffering, as Oscar Wilde, himself a captive, wrote, is one long moment. It has a nightmarish quality, and like a nightmare one forgets it, and finally all that one remembers is that it *was* a nightmare. Six months after the fall of Singapore each P.o.W. had lost an average of 2 stone in weight. Scrotal dermatitis (a riboflavine deficiency) was almost constant. Beri-beri and encephalopathy were prevalent, and xerophthalmia was beginning to be recognized because of an epidemic of peculiar conjunctivitis and corneal ulceration. Many of the dogs that the camp attracted developed paralysis of their posterior extremities and had to be destroyed, a biological confirmation of the defective state of our diet. It should be emphasized that this grave dietetic inadequacy occurred at a place where the Japanese had captured huge stores of tinned foodstuffs—enough to keep the Army for six months or more. The author remembers eating ground-up peanut meal which was decomposed and gritty from admixture with earth. It was procurable in Singapore as fertilizer and we were grateful for the windfall. After all, we thought, what is good for a plant ought to be good enough for a starving doctor, providing he is not called upon to synthesize his own chlorophyll. A number of officers displayed a sudden liking for *bilanchan*, a stercoraceous paste made of prawns and native spices, a little of which savoury invigorated a mound of rice. Most of us

preferred to eat on the windward side of it. A wag sent a specimen of *bilanchan* in a stool container to the pathologist of the dysentery block for examination; he reported: "Fæcal, undigested food particles . . ." Years later we ate such muck gratefully and wondered at our former fastidiousness.

Every farmer knows that it takes about 4 lb. of pig feed to make one pound of pig, and every pædiatrician knows that it takes about 6 lb. or more of pork to make a pound of boy. It is obviously extravagant to make human tissue in this circuitous manner, so the Japanese short-circuited the waste by feeding us the pig-feed. However, when in Siam, a primary food producing country, we tried to raise pigs, they often failed to subsist on our swill, and *their* diet had to be supplemented. It is because of starvation chiefly that to have been a P.o.W. of the Japanese in 1942-3 involved, actuarially speaking, a greater risk than that faced by a fighter pilot in the Battle of Britain, or by an army of Canadians bravely fighting their way through Holland. We lack exact figures, but over one-quarter of the European Ps.o.W. died in the first eighteen months of their captivity, and an equal number had to be admitted to "hospital" for sickness. One may be confident that if the war had continued to go against us, the remainder would also have died. As it was, alarmed by the possibility of retribution, our captors in the last eighteen months relaxed their policy of extermination and began everywhere to destroy written evidence that it had ever existed. Their secret police, the "Kempeis," frequently searched our quarters for diaries. However, the graveyards contain thousands of British and Australian dead and it will be interesting to see by what ingenious ratiocination the Japanese mind will explain this away.

Our captors, for nearly a century have tried to impress the world with the high quality of their civilization. When they took 60,000 prisoners in Malaya, they had an opportunity of showing the world not only that they were excellent soldiers, but that they were decent. Instead, they have turned the word *bushido* into ridicule. Every Japanese, when he could mumble a few words of English, bragged of this code of the Samurai warrior, the Japanese equivalent of the European term, chivalry. What, however, did we prisoners of war understand by it? In the first place, an overwhelming braggadacio and swagger, uncontaminated by such sophisticated notions as modesty, or the decent restraint of good sportsmanship. By bushido, we daily understood that a man must not be reprimanded, but smacked in the face, must not be tried in a military fashion in the guard-room, but beaten like a dog—no, not like a dog: we have never seen a dog, or for that matter any animal, beaten the way the Japanese malhandled their prisoners. By bushido we understood that a man must not merely be disciplined, but outraged as well; must never by any accident be kicked in the rump, but in the testicles. When a P.o.W. was recaptured after attempting to escape, he was charged with *desertion* and shot. Thus, for every infringement, fancied or real, a victim was found and the ends of justice satisfied; failing that, the whole group was punished and woe betide that group when the situation lacked a face-saving expedient. for the record of the Kempeis in extracting information from prisoners was an impressive one. By bushido, therefore, we understood the normal behaviour

of our captors : remorseless, lecherous, treacherous, kindless villainy, villainy that having been done was impertinently presented to the world as chivalry. Once we saw a Japanese patting a pony : it was remarked upon as a thing worthy of comment.

There were several journalists among the Ps.o.W. who doubtless have recorded incidents in support of the above indictment. The following vignettes are evidential :—

This is the story of an elephant with trade union propensities. Ever since the days of James Watt, the inventor of the steam engine, it has been considered that an average horse could do about 550 foot pounds of work per second, a value known in English-speaking countries as the Horse Power. The power of an average healthy man is considered to be about one-seventh of this value. Now the power of an elephant is about six times that of a horse, but the Japanese, by an arithmetic peculiar to their mentality, calculated that 11 Ps.o.W. could do the work of one elephant in hauling railway sleepers, and actually exacted this standard of performance. One elephant, working alongside a gang of prisoners, took offence at the unfair competition ; he picked one of them up with his trunk, impaled him on his tusk so that the point entered his buttock and emerged from the groin, then flung him away. He finally arrived in Chungkai, when we saw him. The tusk miraculously had missed the rectum and femoral vessels. The patient recovered and was thereafter known as Sabu.

While we were in Kanchanburi "aerdrome" camp, the following story went the rounds : A Japanese warrant officer, strutting about with his ridiculous sword at his side, approached a British captain, whose salute he did not consider smart enough. The following performance was witnessed :—

" You English officer-ka ? "

" Yes," was the answer. (*smack*)

" You proud-ka ? " (*no answer*)

" Answer, you proud-ka ? "

" Not proud." (*smack*)

" You proud-ka ? "

" Yes, I proud." !

" Oh, you proud ! " (*smack, smack*)

Then he walked away in accordance with the Geneva Convention. Later in the week the egregious spirit of an Englishman had metamorphosed this humiliating episode : A pig lay a-dying in the piggery. It was therefore sold by the Japanese to us. Its head was disarticulated and placed on the counter of the troops' canteen to advertise for several hours that pork would shortly be on sale. A British officer approached it :

" You English officer, eh ? " (*smack*)

" You proud, eh ? " (*smack*)

" Oh, you not proud, eh ? " (*smack*)

" English shoko [officer] no goodena." (*smack*)

During this performance a Korean sentry had stalked up behind the officer's back, witnessed this scene and, to the surprise of all, had slunk off.

Then there is the story of the bedpans in the Chungkai dysentery wards. There were two bedpans for a ward of two hundred and we were not permitted to borrow tools to make others until several months had elapsed. The dysentery latrines were 200 feet away. A light was not allowed to be shown in the open at night, and in any case consisted of one feeble lamp at the end of the ward. The mud, the rain and the darkness made it impossible for the very ill to get to the defaecation point and perforce they moved their bowels outside the hut by the ditch. When dawn broke our sanitary squads rushed there to cover up the delinquency, making a race of it with the Korean guards who knew what must be going on and rushed to find a justification for sham rage and an all round face slapping. " English soldier no good " they would sneer, pointing to the dung and smacking whomever happened to be about.

We must include the story of the Korean guard O——, for it is not a tale that a journalist can tell. He sent for the surgical specialist at Chungkai and ordered him to perform several circumcisions for his inspection. "But why?" said the officer. "We haven't any local anæsthetic to spare, and besides, it happens that no one needs to have it done."

"I want to see how you do it and if it is dangerous. If I think you are number one, I will order you to do it on me."

The surgeon left with the promise that he would inform him if and when he was doing a circumcision. Next day, O——, despairing of witnessing a circumcision, screwed his courage to the cutting point and ordered the surgeon to circumcise him. "Let me see it," said the surgeon: there was an obvious scar on the corona and several warts were present on the glans.

"You don't need a circumcision," he said, "why don't you let it wear off?"

"In Japanese army everyone must have circumcision because soldiers have too much sickness of penis."

Accordingly his pubis was shaved, disinfected and the local anæsthetic was injected. At this time, the surgeon and his team observed a ferocious-looking sentry with fixed bayonet standing by the patient and watching intently. His job was to make sure that only the foreskin was amputated. When the last stitch had been put in, O—— sat up and looked at the part. "Just like a small boy" he sighed. "You number one—what you want for presento?"

"I take one bottle whiskey" said the surgeon.

"Okay—you get one bottle whiskey."

Meanwhile, the theatre orderly had put the amputated foreskin in a small match-box. This was, of course, no ordinary bit of tissue but coming from a divine people was a piece of the god-head, and to throw it away would have been sacrilege. He therefore gravely presented it to O——, who received it with a puzzled look. Thirty-six hours later the orderly was sent for and ordered to give it a decent burial. It was the dead of night, but it needed it.

The wound healed *per primam* but the surgeon did not get his whiskey. The Korean showed his gratitude in a less expensive manner. One month later the surgeon was ordered to Kanchanburi "aerodrome" camp. It was very crowded and he had no option but to park his miserable belongings in a dry ditch in the open, where he slept at night. One day O—— arrived on a visit, saw the surgeon and gave him a loud hello. "Where you sleep?" he asked. When he saw the place he was horrified. "No goodena," he said, "I fix." He evicted an officer from a nearby shelter and made sure that the unwilling surgeon was installed there. He left orders that this arrangement was to be enforced.

Perhaps the most trying feature of our captivity was the relative or complete lack of news. A professional psychologist would have had a wonderful opportunity for studying the psychology of rumour. The Webber brothers, two officers at Chungkai, bravely kept going a small wireless set, which was powered by torch batteries, but other camps got their news sporadically. The most incredible balderdash was believed as news for months on end. The following story is true and instructive: it is not just a joke:—

A first-class Japanese private called at an officer's mess in Singapore in June, 1942, to pick up a lorry driver. He spoke some English and volunteered the news: "Nippon airplanes go New York. Boom boom boom, no more New York." We made no comment. "Nippon airplanes go Chicago. Boom boom boom, no more Chicago." Still no comment. "Nippon airplanes go San Francisco. Boom boom boom, no more San Francisco."

"B—— s——" said an Australian, irreverently.

The Japanese thought for a moment: "Nippon airplanes go B—— s——. Boom boom boom, no more B—— s——." . . . Months later, when one wished to comment unfavourably on anything, we referred to it as *bushido*, a remark that was less hazardous socially, and expressed an additional nuance of meaning.

The author regrets the injection of this vituperation into the foreword of a set of strictly scientific papers; but it is the imposthume of three and a half years of starvation, of abuse, of neglect, of indignity and of lack of news.

Psychologists no doubt will attempt to explain why a reputedly kindly person like the average little Japanese behaved in this monstrous manner, and they will no doubt tell us that it was mob psychology, and that a large group of people behaves quite unlike the individuals comprising it, just as the mathematical properties of numbers that are infinitely great show some surprising contradictions to our common notions of arithmetic. There is more in it than that, unfortunately : it is a deducible proposition that when two individuals mutually despise each other's ideology, they hate each other (Spinoza) and the greater the love for one's ideals, the more the hate towards those who condemn them. This is, in fact, the usual basis of hatred, when one separates it from fear, an entirely different emotion. Now there can be no doubt that the Japanese religion of Emperor-worship is abhorrent to the white man. Obviously, when the United States Congress initiated a Japanese exclusion bill with the preamble that they were an inferior people, they settled our fate as Ps.o.W., for the Japanese regard themselves as an Asiatic *Herrenvolk* of divine origin. . . . There is one more feature that may be urged to explain our cruel treatment. Human beings, physiologically speaking, are animals who have come up in the world, and not fallen angels. Cruelty is inherent in the human personality, being part of the hunting instinct. It is normally submerged by social pressure. Let a man have enough power, however, and it will promptly appear. Lord Acton who was a historian, not a psychologist, spoke truly when he said : "Power tends to corrupt ; absolute power corrupts absolutely." At a certain stage of the Asiatic war the Japanese appeared to have everything their own way. The omnipotence of a cat playing with a mouse appeared to us to be the same as that of a puffed-up Korean guard swaggering through the huts looking for trouble, exacting compliments from officers, and convincing himself that we were dirt beneath his little feet. For, was he not the representative of Teno Heika, the holy, the high-born, the just one, the rider of the spotless horse, the redressor of wrong, the shadow of God on earth etc.?

However, enough of this sound and fury : more than enough : let us get on with our papers. They were written in captivity at the time the observations were made, and what they lack by inevitable errors of composition and scientific allusion, they gain by vividness. We have not corrected them in any way. They are of historical importance as indicating how medical science functions when freed of paraphernalia in a community which by an evil chance encountered famine and was thrown back into an environment resembling the days of Moses. The first papers were written during the worst period of our captivity, when thousands of sick lay in stinking wretched huts, euphemistically called hospital wards, in Chungkai (see accompanying drawings by Chalker). Because the Japanese continued to search for diaries, these documents were preserved by sealing them in a bottle which was then slipped under a corpse on its way to be buried. They were dug up after the enemy surrendered. Even so, we did not dare at the time to tell the story in all its brutality, lest the papers be discovered. Four papers are herein presented :

1. *Experiences with Cholera in a Jungle Camp in Thailand*, by Capt. J. Markowitz, R.A.M.C. This paper is chiefly of epidemiological value. It demonstrates the value

of preventative inoculation, and the feasibility of making and giving hypertonic saline in the field. The point might be of use in the mass treatment of cholera in India. Incidentally it illustrates that we do not know the cause of epidemics.

II. *A Series of over 100 Amputations of the Thigh for Tropical Ulcer*, by Capt. J. Markowitz, R.A.M.C. Actually 115 patients had one or both thighs amputated by the author; of these, at the time of the Japanese surrender, at least 58 were alive and well. Two patients with bilateral amputation survived. The paper gives a clinical account of aggravated tropical ulcer, with a description of an improvised jungle operating theatre. No case of ring sequestrum followed operation, which we attribute to the fact that periosteum was not stripped at the point where the bone was transected.

III. *Resuscitation under Spinal Anæsthesia without Drugs*, by Capt. J. Markowitz, R.A.M.C. The cause of death under spinal anæsthesia is not circulatory collapse so much as respiratory failure. The former is not urgent and is treated by raising the limbs to an inverted quadrupedal posture; the latter must receive immediate treatment by direct insufflation of air by putting a bit of stethoscope tubing in the patient's mouth and blowing into it. This was surprisingly effective in a number of cases. It is easier and better than other methods since the insufflated air has the advantage of containing CO₂. This rather obvious method was not described by Schäfer because in those days it was thought that CO₂ was harmful.

IV. *The Nature of Starvation Amblyopia*, by Major A. R. Hazelton, A.A.M.C. Various defects of vision were common in the Ps.o.W., ranging from easy fatiguability of the eyes to complete blindness. Major Hazelton with commendable zeal, in spite of a lack of optical equipment, made a valuable study. One type of visual complaint was due to B₁ deficiency, showing itself by easy fatiguability of the eye. In these patients the ciliary muscle was easily exhausted by ciliary ergography, and B₁ relieved their symptoms. Another group showed amblyopia, of which colour blindness was an unexpected symptom. It was not benefited by nicotinic acid, but vision often improved markedly when the diet was supplemented by eggs. It is almost certainly a conal defect. The observations suggest that there is an unknown vitamin controlling retinal function.

These papers record observations made on starved, brutally used Europeans. We owe it to the 20,000 who died that they may be put on record.

[The illustrations are reproduced from the original pictures by Mr. Jack Chalker who retains the copyright.]

RESUSCITATION UNDER SPINAL ANÆSTHESIA WITHOUT DRUGS.

BY

Captain J. MARKOWITZ,
Royal Army Medical Corps.

IN the past three months we have given more than 600 spinal anæsthetics for surgical procedures of various degrees of severity. It irked us to use a spinal anæsthetic for the incision of an ischio-rectal abscess, for example, but we had no other supplies. This anæsthesia was not supported by pre-operative sedatives of any kind and it had to be sufficient for the job. As might be expected, amputation of the thigh subjects an anæsthetic to a severe test, and even under general anæsthesia there are striking cardio-respiratory reflexes when the sciatic nerve is sectioned. In using percaine we attempted to prevent this severe discomfort by using as much as we dared, the maximum dose being 16 mgm. in 10 c.c. of spinal fluid. In spite of this dosage the patients usually winced when the nerve was sectioned. In five cases we encountered dangerous collapse with this dosage. We shall mention only one case in detail :

An Australian O.R. was given 16 mgm. percaine intraspinally. In twenty minutes (before the operation had commenced) his pulse became weak but not rapid, anæsthesia was present up to the suprasternal notch, his voice became feeble and finally failed, he was unable to move his arms, and his respirations, which were gasping, finally stopped. We tried to apply Schäfer's method of artificial respiration, which failed since the chest was already collapsed in an expiratory position from the extreme atony of the muscles; compression of it expelled no air. Luckily there happened to be a piece of rubber tubing nearby which we put in his mouth. He was given artificial respiration by the method used by Elijah the Tishbite when he resuscitated the widow's child. The patient's lips and nostrils were compressed and air was blown into his chest about 20 times a minute. This proved less fatiguing than would Schäfer's method. After a few whiffs the heart at the apex began to beat forcibly and he began to move his eyes as if consciousness had returned. The nostrils began to work. His lower limbs were then lifted up vertically to provide a pressure-head of about three feet as a substitute for the usual peripheral resistance. The effect of this on the pulse was striking; when the legs were lifted the pulse became stronger; when the legs were lowered the effect immediately disappeared. They were therefore held up in the air. After 40 minutes of artificial respiration, the patient's ability to breathe and to talk returned. He could also use his arms feebly. When the tube was taken from his mouth his opening remark was : " I'm glad you guys don't eat onions. I don't like onions." In another 20 minutes the amputation of the thigh was commenced. The anæsthesia had partially worn off and a few c.c. of chloroform had to be used during the sectioning of the sciatic nerve. The wound healed by primary union and the patient is at present alive and well.

It is perhaps unfortunate for the clarity of this presentation that he was given 5 c.c. of coramine and some lobeline intravenously early during his collapse. These of course are central stimulants and the failure was obviously peripheral. The coramine improved the strength of the heart beat somewhat.

We have had similar but less alarming collapses in four other cases, each of which promptly recovered when the lower limbs were elevated. We quickly found that direct insufflation of air succeeded best when the patient was

unable to breathe. Otherwise his own respiratory rhythm failed to synchronise with ours. At this point we would emphasise the Hering-Breuer reflex which states that when air is blown into the lung there is a reflex expiratory effort



The road back. The patient has been helped off the barge by a comrade, to be admitted as a broken wreck to Chungkai hospital. Note the ulcer.

to expel it. The sensory arc of the reflex not only involves the lung tissue but also the thoracic cage. For direct insufflation to succeed best, therefore, the anæsthesia must be sufficiently high to involve the thoracic cage and diaphragm.

On theoretical and practical grounds therefore it appears to be the method of choice in patients who have had an overdose of spinal anaesthesia.

The vascular collapse during spinal anaesthesia is of course due to the sectioning of all the thoracic autonomic vasoconstrictor fibres that leave the cord between the second thoracic and second lumbar segments. The fall in blood pressure is merely one of the manifestations of this sympathetic paralysis; another is the copious defaecation so commonly observed under high spinal anaesthesia. Occasionally the fall in blood pressure reaches a dangerously low level requiring the injection of a vasoconstrictor drug such as ephedrine. However, the profession needs to recall the original measurement of arterial blood pressure by the Rev. Stephen Hales 150 years ago. He cannulated the femoral artery of a mare and using the trachea of a goose as connecting tubing he admitted the blood into a vertical glass tube. It rose to a height of more than six feet, the exact level fluctuating with respiration. In the light of this experiment an obvious way to raise the peripheral resistance of a human is by elevating his lower limbs.

The relatively slow pulse of a patient who is collapsed under spinal anaesthesia is noteworthy. According to Marey's Law the pulse rate rapidly accelerates as the blood pressure falls. This is a reflex originating in the carotid sinus and the arch of the aorta, the effector arc being the stellate ganglia and the cardiac plexus of the thoracic sympathetic chain. It is generally supposed that this involves the upper six thoracic nerves. In spinal anaesthesia with collapse one would expect, therefore, that the pulse would fail to accelerate only when the anaesthesia reached above the nipples. This is not the case and there is no scientific explanation for the fact unless one believes that the adrenals play a part in Marey's Law.

SUMMARY:

The usual cause of death from mishap in spinal anaesthesia is respiratory failure. We found that this could be prevented by artificially ventilating the patient by insufflating air into his mouth with a rubber tube. The vascular collapse was successfully treated by raising the lower extremities their full height. These conclusions were based on five patients. It is pointed out in this paper that the hypotension of spinal anaesthesia is not accompanied by an accelerated pulse, for which there is no adequate explanation.

EXPERIENCES WITH CHOLERA IN A JUNGLE CAMP IN THAILAND.

BY

Captain J. MARKOWITZ,
Royal Army Medical Corps.

"Sunt lachrymae rerum et mentem mortalia tangunt."

VIRGIL.

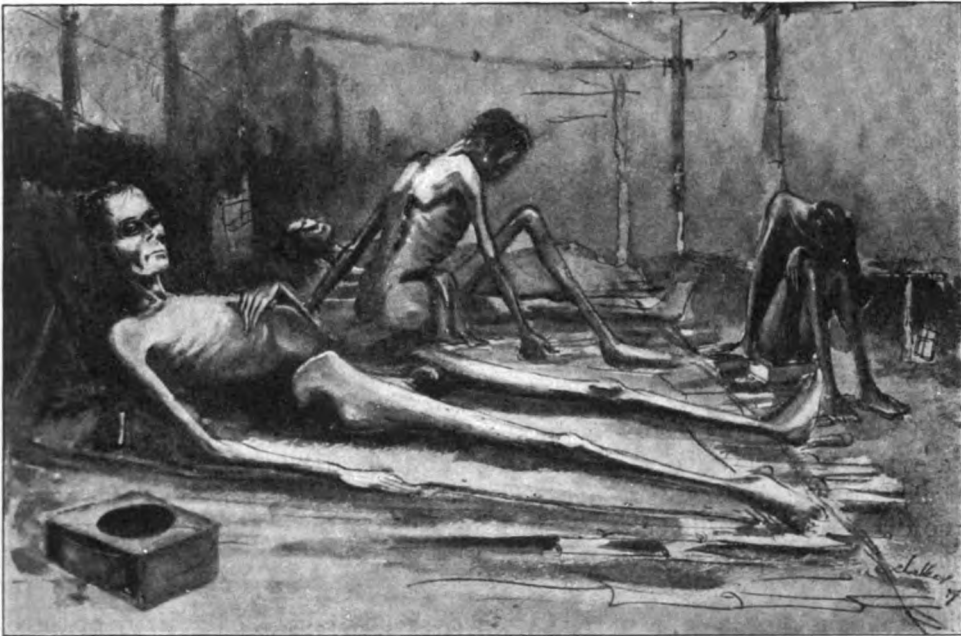
THIS paper is an analysis of an unusual outbreak of cholera in a confined community of 7,000 more or less disabled British and Dutch prisoners of war. By the middle of May, 1943, disquieting rumours reached us of outbreaks of cholera among railroad construction parties in Central Thailand. All these rumours agreed on two things: the outbreak was severe and facilities for treating the cases were non-existent. Some heroic improvisations were rumoured—in one camp a medical officer made an intravenous needle by drilling a bamboo thorn, by means of which he infused a salt solution made by adding table salt to boiled river water. One presumes therefore that even rain water was lacking which, at a pinch, can be made to do in place of distilled water. At about this time one case of cholera was admitted to No. 1 Base Hospital at Kanchanburi:

Case History: Two British O.R.'s engaged in driving a lorry accepted some food which a native hospitably gave them. This they ate with relish. About 24 hours later when on duty both men took ill and one of them collapsed. Both were brought into hospital. The collapsed patient complained of copious diarrhoea, buzzing in the ears, dimness of vision, and he was cold and almost pulseless. He could not stand. The stool resembled rice water but a hanging drop examination failed to disclose any motile organisms. He was isolated with the provisional diagnosis of cholera and died during the night despite a subcutaneous injection of one litre of Ringer's solution. His companion, admitted at the same time with less severe symptoms, recovered. The Japanese poo-pooed the diagnosis of cholera on the grounds that there was none in the vicinity, and the case was labelled choleraic dysentery.

On June 14, after we had been transferred to Chungkai, a Tamil was found by Major M. T. Read, M.C., R.A.M.C., to be dying of cholera outside our enclosure. That night two patients in the surgical ward developed cholera within a few hours of each other. The first case was typical and was isolated. The second case when seen by the surgical officer had profuse watery diarrhoea with brown faecal motions. His ailment was not recognised until he died during the night. Fortunately, owing to the existence of cholera up country, inoculations against cholera had already commenced on June 14, and were completed by the 15th. The evolution of the epidemic is shown by the diary of events at the end of the paper which discloses that it came in two waves separated by an interval of two weeks. The first ended July 15 after a duration of exactly one month; the second and lesser wave tailed off on September 15 after a duration of six and a half weeks. At the moment of writing (November 26, '43) there are

two cases of cholera in the isolation ward having been admitted on the 7th and 19th respectively.

The fact that cholera had broken out in the camp was unwelcome to the Japanese guards who on subsequent occasions complained that this diagnosis put the area under quarantine. Squadron Leader Cummings, R.A.F., our pathologist, was impressed by the Japanese to work in a nearby Field Laboratory and from him we learned that their examination of suspected stools was perfunctorily carried out by an orderly. Cultures were made of the stools in the accepted manner and both these and faecal suspensions were incubated with immune rabbit serum for precipitation. He told us that we were to



Dysentery ward Chungkai. Only 2 wooden home-made bed pans are available.

regard a negative result as being worthless. At any rate this is the most charitable explanation we can offer for the fact that in spite of several faecal specimens having been sent to the Japanese laboratory from typical cases they reported them negative and declined to take action. However, on June 23 they reported that all five stools which we had sent from five typical cases were positive. Three days after the receipt of four more stools (June 27) the Japanese cholera squad arrived and took cultures from all the patients in the cholera ward. With this official recognition came an enhanced supply of disinfectants and 12 ampoules of Ringer's solution, each containing 300 c.c's. By this time the disease was prevalent in the surrounding villages and one

heard stories of Tamil labourers collapsing on the latrines or being found dead in the fields.

In the first week of the epidemic most cases were patients already in hospital suffering from other diseases, although these comprised only approximately 20 p. c. of the population of the camp. Among these the majority were suffering from avitaminosis, bacillary dysentery or tropical ulcers. Indeed, as nearly as could be ascertained in our final analysis of this wave, out of 42 patients admitted who were not confined to bed in the hospital proper, only two were category B (fit for light duty), the others were category C (unfit for duty). On the whole, therefore, our figures bring out the fact that the first wave of the epidemic was largely confined to the sick and the unfit.

As stated above the Japanese on June 23 reported that all five faecal specimens sent in were choleraic stools. Details of the five positive cases follow :

Sigm. M., age 26. Ten days before his admission for cholera this patient was admitted for acute bacillary dysentery, and was discharged category C two days before he developed cholera. Convalescing when positive report received.

Sgt. R., age 31. This man had chronic diarrhoea for many months, which was diagnosed seven months ago as amœbic dysentery. Convalescing when positive report received.

L/Bdr. B., age 26. Transferred from dysentery ward, having had diarrhoea for one month. Convalescing when positive report received.

Lieut. S., age 49. This officer was permanent category B on account of age. Convalescing when positive report received.

Sigm. C., age 36. Transferred from dysentery ward where he had been for three months. Died six days after positive report received.

It will be seen that the second wave comprised less than half the number of cases in the first wave ; the mortality, however, was the same—42 p.c. as against 40 p.c. in the first wave. The mildness of some of these cases made the diagnosis more difficult as shown by the fact of a higher proportion of suspects who turned out not to be cholera and who were quickly discharged. The lesser number of cases involved in the second wave is in part due to the fact that the preventative inoculation had already taken hold. Many of these afflicted were comparatively healthy individuals. At least six worked in the cookhouse peeling vegetables ; despite repeated warnings and threats of disciplinary action they would secretly nibble choice titbits of pumpkin, onion, etc. We have the impression that when they developed cholera it was more severe than usual.

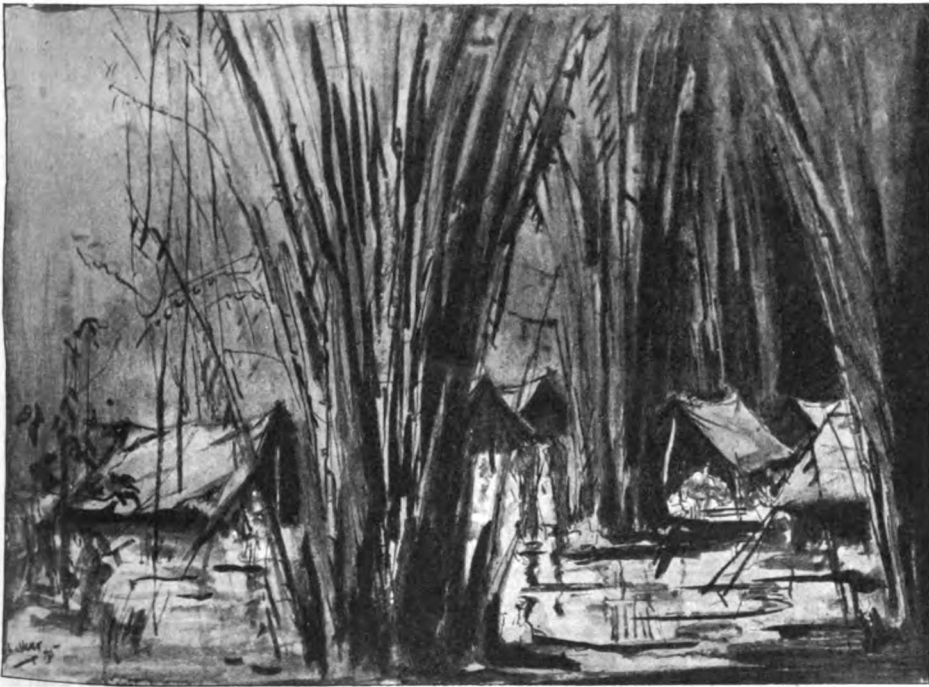
DIAGNOSIS.

As soon as cholera was recognised in the camp it became important to formulate diagnostic criteria which would enable us to act quickly and appropriately. Every case of severe diarrhoea was regarded with suspicion. It was transferred to the cholera ward when it presented one or more of the following four cardinal symptoms :

- (1) Copious watery stools, more particularly rice water stools ;

- (2) collapse which in typical cases occurred in the Asiatic type of latrine, the patient being unable to rise from the squatting posture ;
- (3) sudden alteration in the timbre and strength of the voice ;
- (4) muscular cramp.

Hospital orderlies quickly learned to recognise these criteria. In most cases the diagnosis was evident at a glance. In the first wave of the epidemic, indeed, the great majority of the patients presented all the symptoms, progressing to



Cholera isolation ward at Hintock, Siam. The flood is typical. The cholera patients at Chungkai had to be moved several times because of flood, and finally were nursed on a ground-sheet on a piece of dry ground, until a tent was erected over them.

vomiting, cyanosis, dehydration and anuria. The presence of tenesmus in a patient with diarrhoea is generally considered as evidence against the diagnosis of cholera. While this is a sound rule for healthy communities, it was less valuable in this camp since so many of our patients had a history of dysentery. In these, choleraic enteritis was often accompanied by tenesmus.

The diarrhoea of cholera differs from the diarrhoea of ordinary enteritis owing to the fact that the site of the disease is largely the ileum. This moiety of small bowel is predominantly absorptive in function. Into it are normally

poured the chloride-laden secretions of the stomach, liver and pancreas which are only imperfectly absorbed in the upper bowel. In choleraic ileitis, therefore, there is not only an inflammatory transudate as the result of the cholera, but there is the failure of absorption of whatever reaches this part of the gut from above. We have often seen rice in the rice water stool. The value of morphine in cholera, were it available, would be to slow down the reflex peristalsis of the colon enabling absorption to occur.

A suspect was discharged from the cholera ward when he had (a) no other symptoms of cholera beside profuse watery diarrhoea and when, in addition, (b) the stool became faecal in two or three days.

Case History : Pte. S., admitted 20/6/43, a batman in the R.A.M.C. officer's mess, developed profuse watery diarrhoea. He passed 18 stools in 24 hours, a unique occurrence for him both before and since this episode. In the cholera ward he appeared quite well, sitting up, eating all the food offered him and smoking continuously. He passed faecal stools by the second day after admission, when he was discharged.

Although this man was quickly released from quarantine, it is impossible to say that he did not have cholera.

Case History : Capt. M., R.A.M.C., while giving an intravenous injection of saline to a patient with cholera received some cholera vomitus full in the face. Next day he developed a watery diarrhoea which became more profuse as the day wore on and late at night he passed his eighth motion consisting of about a pint of fluid. He felt slightly cold, had slight cramps in the feet and the medical officer who attended him thought there was slight cyanosis of the finger nails. He was given $\frac{1}{4}$ gr. morphine with atropine by mouth and 24 hours later was perfectly well and able to resume his duties.

It is likely that the number of cases of true cholera is greater than those presented here, since an odd mild case quickly recovered without development of pathognomonic features and was promptly released with advice to wash the hands after defaecation.

ETIOLOGY.

It is this feature of cholera which makes control of an epidemic so difficult in a community. The cholera vibrio can and does exist in the intestine with no symptoms until something upsets the symbiosis, usually a bowel irritant. It would appear that the negative phase following inoculation may precipitate cholera in such individuals. Thus the crest of the first wave occurred four days after the inoculation of the camp and the bulk of the cases in this wave occurred in two weeks.

Four officers in the first wave lived in a crowded hut within what might be called flatulating distance of each other ; all four developed cholera in two days. Indeed, the spread of cholera by such contact appeared to be a common mode of transmission. The number of men in this Mess was at least 100. In fact, there was no evidence that this outbreak was spread by food or water, with the exception of cooks who surreptitiously nibbled raw vegetables. During the outbreak drinking water was superchlorinated and an effort was made to serve all meals piping hot. Anti-fly measures were intensified.

Not one orderly attending the sick in the camp developed the disease although they often became soiled with faecal discharges and vomitus. They were careful to disinfect themselves meticulously.

It could be argued that the epidemic was transmitted by flies or dust. We have no evidence on these points ; our impression was that it was transmitted by direct contact through carriers. The extent of human commerce in faecal particles is not adequately appreciated. The management of defaecation is not

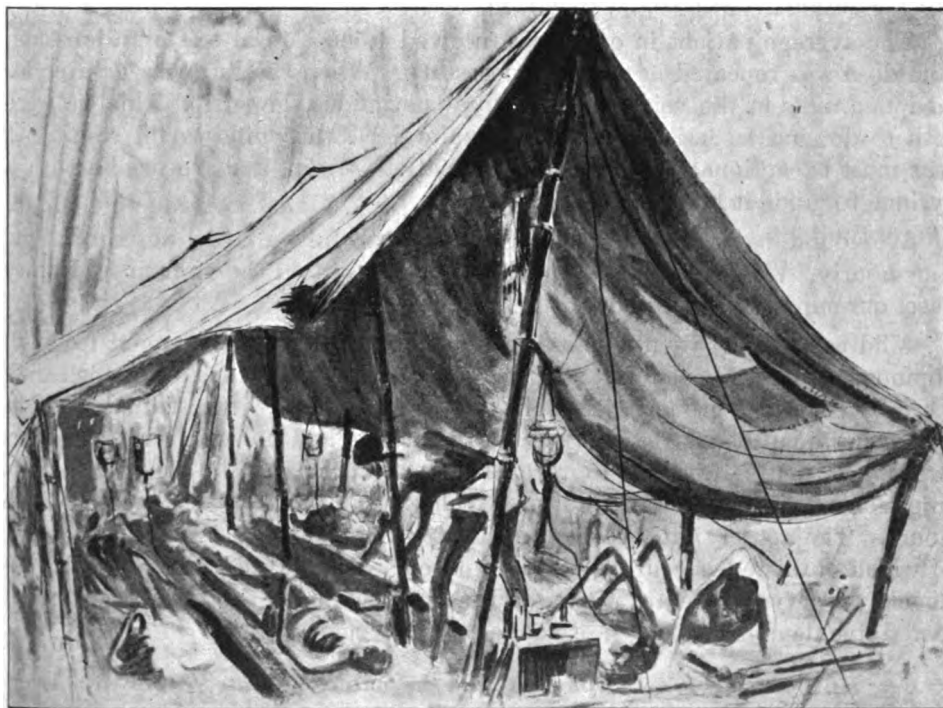


FIG. 2.—Cholera isolation ward, June—August 1943, Hintock, Siam. The one at Chungkai was similar, except we had an atap hut instead of a tent.

aseptic and seldom clean. Moreover, the expulsion of flatus should be regarded in the same light as the cough of an open case of tuberculosis. This point has not been emphasised enough, obviously on the grounds of indelicacy.

TREATMENT OF CHOLERA.

One week prior to the outbreak of cholera a still was improvised out of two four-gallon kerosene tins, and a supply of distilled water was thus rendered available. At the same time ordinary table salt was re-crystallised twice from distilled water. The task of administering saline *aseptically* to so many patients

through our improvised infusion apparatus defeated us. We quickly found that if the water was collected hot from the still and was used within two hours domestic cleanliness sufficed and chills did not occur. The infusion apparatus was boiled daily. Just before use it was rinsed with fresh saline. In point of fact the Japanese supply of Ringer's solution in hard glass ampoules caused slight chills and was hence inferior to our material. We have shown conclusively that the pyrogenic substance is absent from *freshly* distilled water. This fact should be valuable in the mass treatment of cholera in the field. One litre of distilled water hot off the still is treated with 50 c.c.'s of 25 p.c. sodium chloride stock solution. The latter need not be fresh.

The average patient in our series received 1,500 c.c.'s of this on admission. The dose was repeated as often as necessary. When the flux was greater we tied a cannule in the vein and kept up a continuous slow drip. This we were loth to do since asepsis could not be maintained and chills would result. It was most exceptional to cut down on a patient's vein, a sharp needle with a syringe to guide it being sufficient.

We found potassium permanganate of doubtful value in doses of 2 gr. four-hourly. We had the impression that it aggravated the vomiting. In any case, our supply was limited.

Mild cases and patients who were not vomiting were encouraged to drink copiously of physiological salt solution and well salted beef tea. For food they were given sweet ground rice, soft boiled eggs and a little tinned milk in increasing quantities. It bears repetition that we had no supplies of remedial drugs. Patients destined to recover reacted promptly to an intravenous injection of hypertonic salt solution which generally had to be repeated in 24 hours. The acutely fatal cases continued their copious diarrhoea, the extent of which outdistanced our efforts to replace the lost fluid. An occasional case developed a typhoid state with delirium and picking at the bedclothes which lasted five days before death or convalescence began.

Case History : Sgt. R., was admitted from the amœbic dysentery ward with severe cholera. He was infused repeatedly for the next three days by which time he appeared to be dying. He was given frequent small quantities of a mixture of milk, raw egg and samsu (a native rice spirit). He was delirious and incontinent for three more days before he began to improve. Five months later he was carrying out duties as an orderly in the cholera ward.

We found accidentally that the infusion of 2 p.c. salt solution was an even better method of meeting cholera than the 1.2 p.c. solution generally in use. This might bear some emphasis. It appeared that the introduction of hypertonic salt solution into the blood stream stopped or ameliorated the flux by competing with the bowel for fluid. For example, a patient might pass a large stool every hour until he received his infusion when the diarrhoea would dramatically stop for six hours. As in the case of cerebral œdema, this effect is purely osmotic.

The usual causes of death were diarrhoea which outpaced the infusion, with resultant circulatory collapse; toxæmia and fever; cardiac failure,

generally heralded some days before by feebleness of pulse, cardiac irregularity and, characteristically, by an alternating pulse. In some instances death could be ascribed to a generalised enfeeblement of the vital powers one week after the choleraic flux had ceased. This showed itself by diarrhœa, anorexia and terminal pneumonia. Anuria resulting in uræmia was an uncommon cause of death. In brief, a patient could die from cholera either from loss of fluid so that his plasma oozed out through the bowels—a condition comparable to high intestinal obstruction or to the shock displayed in a patient grossly scalded by steam; or he could die of toxæmia as in any other infectious disease.

CONCLUSION.

An outbreak of cholera is described in a Prisoner of War Camp in Thailand. Its chief interest is in its restricted extent. An additional feature is our discovery that distilled water taken fresh from the still can safely be used without the development of chills. This fact should prove of value in the mass treatment of cholera in the field. It was found that 2 p.c. salt solution had some advantages when infused compared with the more dilute fluid.

DIARY OF EVENTS.

Cholera Epidemic : Chungkai P.O.W. Camp, Thailand.

Date	Admitted (true and suspect)	Suspects discharged	Died	Cholera	
				True cholera	Case mortality rate
June 14/15	2	—	2		
" 16	6	—	—		
" 17	11	—	5		
" 18	20	—	3		
" 19	17	—	2		
" 20	17	5	1		
" 21	14	4	2		
" 22	11	6	2		
" 23	14	11	—		
" 24	7	1	5		
" 25	2	3	5		
" 26	1	—	2		
" 28	—	—	1		
" 29	1	—	1		
" 30	—	—	1		
July 1	1	—	2		
" 3	—	—	1		
" 4	—	—	2		
" 6	—	—	1		
" 9	1	—	—		
" 15	1	—	—		
Total	126	30	38	96	40 p.c.

Continued overleaf.

Date	Admitted (true and suspect)	Suspects discharged	Died	Cholera	
				True cholera	Case mortality rate
July 31	2	—	—		
Aug. 2	7	—	—		
" 3	2	—	—		
" 4	2	—	—		
" 5	3	—	2		
" 6	1	—	1		
" 7	4	1	—		
" 9	2	—	1		
" 10	2	—	1		
" 11	17*	6	2		
" 12	1	—	—		
" 13	1	—	—		
" 14	1	—	1		
" 15	2	—	1		
" 17	1	—	1		
" 18	—	—	1		
" 20	1	—	1		
" 21	3	13*	—		
" 22	—	—	1		
" 23	3	—	—		
" 24	5	—	—		
" 25	—	—	1		
" 27	2	1	1		
" 29	1	—	—		
Sept. 1	—	6	—		
" 3	1	—	—		
" 6	1	—	—		
" 9	1	1	—		
" 10	1	—	—		
" 12	—	2	—		
" 13	—	2	—		
" 14	1	—	—		
Total	68*	32*	15	36	42 p.c.
Nov. 7	1	—	—		
" 19	1	—	—	2	
Grand Total	196*	62*	53	134	41 p.c.

* Includes 11 convalescents admitted from up country camp who were not considered in our series.

A SERIES OF OVER 100 AMPUTATIONS OF THE THIGH FOR TROPICAL ULCER.

BY

Captain J. MARKOWITZ,
Royal Army Medical Corps.

Haec olim meminisse juvabit.

VIRGIL.

[The Consulting Surgeon to the Army writes : This deserves publication as a permanent record of the indescribable hardships and suffering from multiple disease and inhuman conditions endured by Britons in slavery in Thailand.

The Surgery described is drastic and heroic—tragic, in that under different conditions little might have been necessary ; surprising in the recovery rate ; and inspiring as a record of R.A.M.C. labourers of all ranks achieving the impossible.]

TROPICAL ulcer is a well-recognised cause of disability among troops on service in Malaya, India and elsewhere, but the frequency with which it was encountered among prisoners of war in Thailand was appalling. In addition, the severity of the lesion was often much greater than that usually portrayed, being in many cases an acute phagadænic process, at its worst resembling rapidly spreading infectious gangrene. These ulcers are known to result from trauma in jungle countries. They begin commonly as a minute pemphigus-like vesicle which soon becomes scabby and is surrounded by a wide zone of inflammatory œdema. It may localise, forming a minute ulcer, or may spread more or less widely before extensive lesion of continuity occurs ; more usually ulceration and spread occur at the same time. Once ulceration occurs surrounding œdema tends to ameliorate and the condition usually becomes localised. Invariably it is chronic. Commonly an ulcer the size of a shilling takes three months to heal in a person who is otherwise in fair health. In a large minority of cases localisation alternates with spread both laterally and into the underlying tissues, in extreme cases involving and destroying fascial sheaths, tendons, periosteum and bone. Although blood vessels are often involved secondary hæmorrhage is uncommon probably because the advancing margin of the ulcer is preceded by a gangrenous change which includes vascular thrombosis.

In this series we present the first 100 patients who came to amputation. The decision to remove the limb was, in the first case, a desperate attempt to save a dying man and, in many instances, was made too late. Our early reluctance to amputate was due to the fear that with our primitive conditions the mortality would be alarming and that more lives would be saved by expectant treatment. However, by the application of simple Listerian principles we found that the mortality from the operation *per se* was negligible. Although conditions in the wards approximated to those described by Florence Nightingale in the Crimean War, it was possible to perform even a bilateral amputation of the thigh safely with smooth recovery.

Before describing more minutely this series of cases, we might explain why so desperate an expedient as amputation was so often necessary. This jungle camp hospital at Chungkai receives most of its patients from railway construction parties in central Thailand. It was their duty to complete a railway by a certain date. In many instances, this entailed inadequate rations (perhaps only rice) and entire absence of quarters. Patients quickly developed dysentery, malaria, beri-beri, pellagra and tropical ulcer, in such numbers that the Japanese had no option but to work the sick. Often the Japanese guards worked side by side with the men. The fact that hundreds, possibly thousands, died may have been regretted by the Japanese but it was certainly regarded as a military necessity. The following letter read out to all the troops by the Japanese explains itself. It is a good example of English as she is Japped by a second-rate interpreter :

INSTRUCTIONS GIVEN TO P.O.W. ON MY ASSUMING THE COMMAND.

I have the pleasure to lead you on the charge of last stretch of Railway Construction Warden with the appointment of present post.

In examination of various reports, as well as to the result of my partial Camp inspection of the present conditions, am pleased to find that you are, in general, keeping discipline and working diligently. At the same time, regret to find seriousness in health matter.

It is evident that there are various causes inevitable for this end, but to my opinion, due mainly to the fact for absence of firm belief us Japanese "Health follows will" and "Ceases only when enemy is completely annihilated."

Those who fail to reach objective in charge, by lack of health or spirit, is considered in Japanese Army as most shameful deed : "Devotion till death" is good, yet still we have the spirit, "Devotion to Imperial cause even to the 7th turn of life in incarnation," the spirit which, cannot become void by death.

You are in the act of charge in colleague with Imperial Japanese Army. You are expected to charge to the last stage of this work with good spirit by taking good care of your own health.

Besides, you are to remember that your welfare is guaranteed, only by obedience to the order of the Imperial Japanese Army.

Imperial Japanese Army, will not be unfair to those who are honest and obey them, but protect them. You are to understand this fundamental Japanese spirit, and carry out the task given you, with perfect ease of mind, under protection of I.J.A.

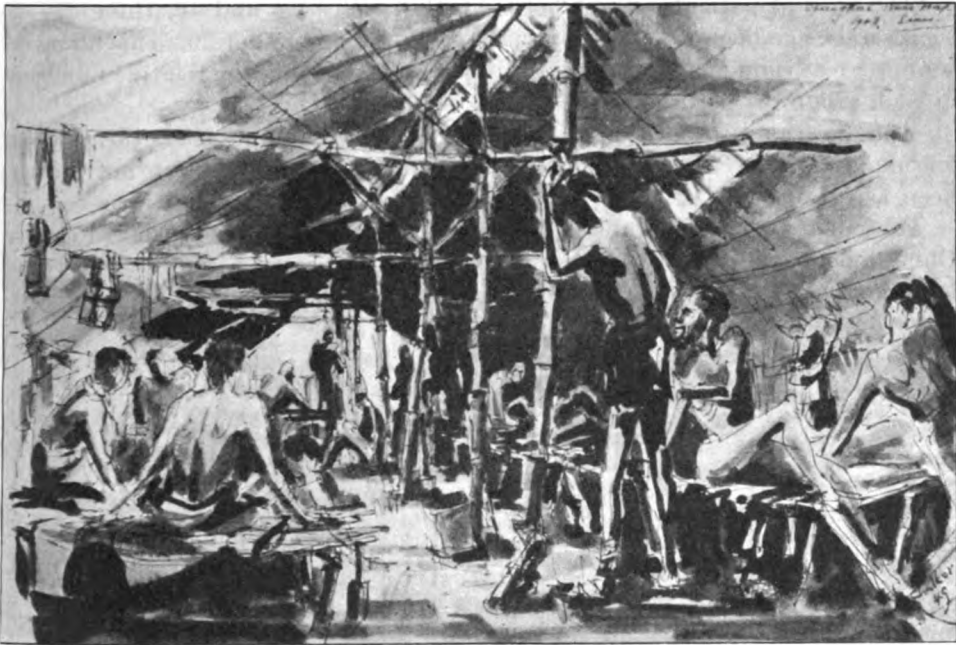
Given in Kanchanburi, June 26 '43.

- Col. Sijuo Nakamura.

Commander of P.O.W. Camp in Thailand.

In addition to the greatly depleted state of the patients who arrived in our hospital from up country, other factors played a part in preventing the healing of these ulcers. The Oriental standard of living compared with the European is a low one. Our troops lacked even this humble level of subsistence and were in fact the slaves of coolies, from a material point of view. There was therefore an almost total absence of dressings and appurtenances without which a hospital resembles a lazar house. Had these patients been treated in British military hospitals few would have come to amputation. At the time of writing for example there is no toilet paper and those patients with high morale use the leaves of trees ; the others terminate defaecation in the quadripedal manner.

If the R.A.M.C. personnel had not worked like heroes a state of affairs resembling what occurred in Mesopotamia in 1916 during the last war would have happened. At the time of writing, it appears that our hospital performs amputations for tropical ulcer far more often than others, and this anomaly disturbed us. Before operation was done the medical officer talked the matter over with the patient who gave his consent to amputation if it should be necessary. The surgical officer was then consulted and, in the face of indications outlined below, advised amputation. The Commanding Officer of the hospital, or his deputy, then interviewed the patient and examined him. As it happened, he always concurred in the necessity. In only one instance was unanimity not complete. This involved the case of a soldier both of whose limbs had to be amputated in



Specimen ward from Chungkai base hospital. All these men had left was their sense of humour.

the opinion of the surgical officer and the C.O.; in the opinion of the medical officer of the ward, one limb was beyond redemption and he felt the other could be given a little longer time in the hope of saving it. Since the patient also had amœbic dysentery and a bed sore over the sacrum 4" in diameter and was greatly emaciated, we considered this most improbable. At the time of writing (33 days after operation) the stumps are healed, his dysentery is confined to three stools a day and his bed sore is granulating satisfactorily. We hope to cover it with pinch grafts shortly. [Addendum : He was well at the time the war ended.]

In the face of the unanimous opinion of all the medical officers in this camp it remains to explain why we had so many cases requiring amputation. Over 75 p.c. of these cases came from two groups of camps which underwent particularly severe privation and overwork. This hospital acted as a base hospital to these areas and we are certain that we have the majority of the bad ulcers in Thailand. [Lt.-Col. A. E. Coates, A.A.M.C., had an identical set of cases in Burma at the same time.] Tropical ulcers in our camp at this moment (Nov. 19, 1943) number more than 2,000 cases of which about 500 are bed-ridden. There is not the same likelihood of amputation being required in these ; in fact, about 150 have already been booked for skin grafting when the surface of the ulcer appears receptive.

ETIOLOGY.

The ages of patients varied between 21 (four cases) and 40 (three cases), the average age being 28. Approximately 40 p.c. were under 30. This however is of no great significance as it was impossible to ascertain the relative numbers in each group of the force at risk.

The duration of the ulcer from its inception until amputation varied from one month (three cases) to eight months (one case), the duration not having been ascertained in 12 cases. The average duration was $3\frac{1}{2}$ months.

As will be seen from table 1 trauma is the outstanding etiological agent. Our clinical experience confirms the work of others in assigning a specific infectious basis to the condition. The author often developed tropical ulcers super-imposed upon blisters of the feet.

TABLE 1. *Original Cause of Ulcer.*

Bamboo scratch.	Rock splinter or stone.	Septic blister.	Hammer blow (accidental).	Railway spike (accidental).	Axe blow (accidental).	" Knock."	Punitive blow by guard.	Cause not ascertained or unknown.	Total.
32	6	5	2	2	1	2	4	46	100

The incidence of intercurrent disease is shown in tables 2 & 3. It will be seen that approximately 75 p.c. of the series had one or more serious intercurrent disease. Often the downward progress of an ulcer dated from an attack of malaria. The next commonest cause for a relapse of an ulcer was nutritional deficiency, either beri-beri or pellagra, or a combination of both. Next in importance was amoebic dysentery.

TABLE 2. *Other Diseases during Course of Ulcer.*

28	Malaria.
2	Malaria and amoebic dysentery.
1	Malaria, amoebic dysentery and avitaminosis.
7	Malaria and diarrhoea.
4	Malaria and avitaminosis.
3	Malaria and pellagra.
1	Malaria and beri-beri.
8	Amoebic dysentery.
1	Amoebic dysentery and beri-beri.
1	Amoebic dysentery and avitaminosis.
1	Diarrhoea and beri-beri.
1	Diarrhoea and pyrexia undiagnosed.
2	Pyrexia undiagnosed.
1	Pyrexia undiagnosed and avitaminosis.
3	Avitaminosis.
3	Beri-beri.
1	Pellagra.
1	Diphtheria.
18	No other illness.
13	Not ascertained.
100	Total.

Commonly, relapses of ulcers could be ascribed to evacuation of a patient from one camp to another, the conditions of transit in open trucks or barges for many hours permitting no facilities for a change of dressing or treatment. In some cases two or more days would be spent on these journeys, and patients were compelled to walk varying distances from one means of transport to another. Feeding arrangements were often poor and shelter frequently inadequate.

TABLE 3. *Incidence of Individual Diseases during Course of Ulcer.*

Malaria.	Dysentery.	Diarrhoea.	Pyrexia undiagnosed.	Polyavitaminosis.	Beri-beri.	Pellagra.
46*	13	3	4'	10	6	4

* includes at least 20 cases with more than one attack (up to 10).

' two with repeated attacks.

It has been mentioned elsewhere that bad food, slave conditions of housing and working, and absence of medical facilities had much to do with the origin and rapid deterioration of tropical ulcers. In many cases men have been forced out to work for varying periods who should have been confined to bed, with the inevitable result that their condition became rapidly worse.

INDICATIONS FOR AMPUTATION.

In brief the indication was to save life.

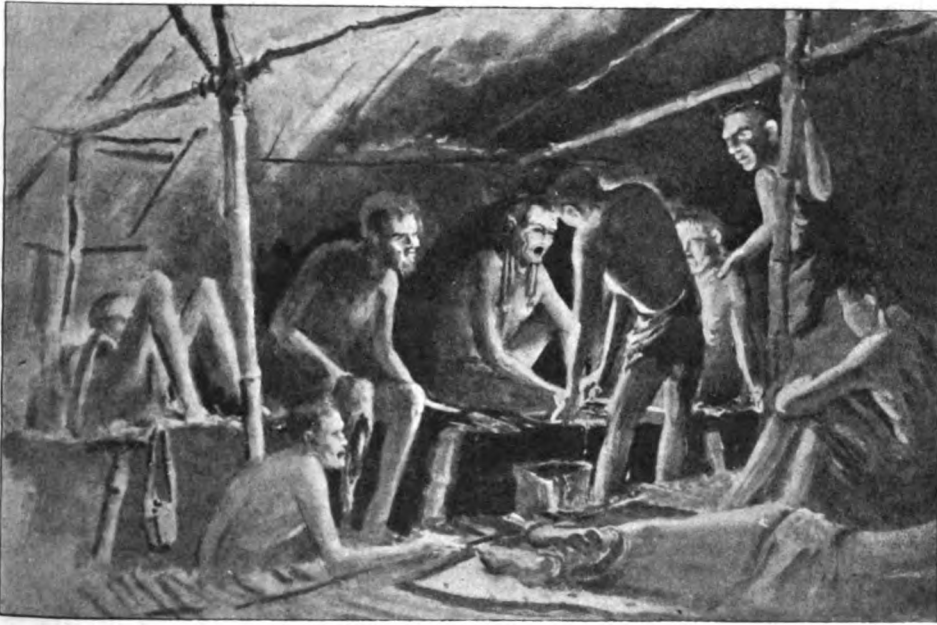
(1) A large sloughing ulcer not necessarily involving bone, with infectious gangrene extending under the skin up the musculo-fascial planes. When the patient's condition permitted it, débridement was performed under anæsthesia (in 34 cases that came to amputation). In hundreds of other cases, when this was combined with a blood transfusion to build up the patient, healing occurred, resulting in a large granulating surface. Many of these cases are now awaiting skin graft.

(2) An ulcer which involves underlying bone with such evidence of spreading osteomyelitis as extreme tenderness up and down the tibia, high fever and rapid deterioration of the patient. All of us felt that the wisest course here was prompt amputation above the knee if 6" of tibia could not be spared. We would emphasise that the involvement of bone in an ulcerative process was by itself no indication for amputation. Many such discharged a sequestrum or had it removed, and healed over completely ; many await skin grafting.

(3) Similarly, the involvement of metatarsal, tarsal, or ankle joints with adjoining infection of bone generally called for amputation at the nearest site of election. This was an unusual indication. For example, we have recently seen an ulcer covering the whole dorsum of the foot which quite successfully took all 32 pinch grafts of skin.

TREATMENT OF TROPICAL ULCER.

Before describing the operative technique and a more detailed analysis of some of these cases we might say a few words about the treatment of tropical ulcer in this hospital. The nature of this treatment was entirely conditioned



Amputation ward. The patient has had his thigh amputated, and the stitches have just been removed. A boiled dressing is being applied. Note the rag around his neck—a bandage. The 4-gallon drum is for soiled dressings, which will be washed, boiled and used again. The patient on his right is due to have his leg amputated as soon as we can get to him.

by the supplies of drugs and dressings. Most of us were agreed that the ideal treatment was to clean the ulcer once or twice a day with an antiseptic lotion, for example mercury biniodide or perchloride, then sprinkle it liberally with iodoform powder, over which a sterile dressing was applied. We found iodoform the most uniformly successful dressing, which often acted magically (*cf.* the use of BIPP in the last war in infected wounds). However, what small quantities of iodoform reached us were quickly used up. Almost the same remarks might be made about sulphonamide or sulphapyridine dusted over the ulcer. Failing these drugs, we used lotions of potassium permanganate, mercury biniodide,

lysol, eusol, eusol emulsion in coconut oil, a one in twenty powder of calomel in zinc oxide, boric acid powder, salol, salicylic acid and aspirin. As quickly as we ran out of one antiseptic we used another. There was never any shortage of lysol and chloride of lime. A solution of the latter containing 0.5 p.c. of chlorine was euphemistically referred to in this area as eusol. These applications were made under the grave disadvantages of insufficiency of bowls, dressings, bandages, dressing forceps, fresh water and indeed of orderlies. Transfusion was resorted to more frequently than would be the case in Europe for it was our only method of building up resistance. More than 80 p.c. of the ulcers that came to amputation had been transfused.

Among our supplies we found a few ampoules of 2 p.c. Trypaflavine (Bayer) which, according to the circular, could be used intravenously for ulcers. A series of six patients was given twice weekly injections of 5 c.cs. of 2 p.c. Trypaflavine, on the whole with striking improvement. The fact was unexpected although it was known from the work of Menkin that antiseptic dyes are removed from the blood stream by localised inflammatory processes. We were fortunate to get a supply of Flavine (May & Baker) which is isomeric with the Bayer substance. We made this material up in saline and treated a series of 22 patients with it, again with gratifying results.

It has been suggested that a good treatment for these ulcers would be to put them up in plaster of paris after the method of Winnett-Orr. This technique has every *a priori* consideration against it. The patients had suffered from over-neglect and to sophisticate the procedure by immobilising the limb in plaster of paris seemed to us a mockery. On the contrary when a few experimental ulcers were treated by frequent application of warm antiseptic solutions and sterile dressings they quickly improved.

OPERATIVE TECHNIQUE.

Patients who came to operation were generally in poor shape. Most were emaciated, many had an obviously pellagrous skin, many had a watery diarrhoea, passing about 10 stools in 24 hours, which from the appearances of their tongue and the absence of inflammatory exudate in the faeces we designated as pellagrous. A few had amoebic dysentery. It became necessary therefore to use a technique which would combine rapid surgery with reasonable prospects of having a useful stump. The wretched conditions in the wards made a two stage operation out of the question. As a rule when a good 6" of tibia could not be saved amputation was done at the lower thigh. In a few instances we succumbed to the importunings of the patient and left a short stump of tibia. In two cases this turned out to be so unwise as to necessitate re-amputation at the usual site, the wound having totally broken down probably as a result of an extension of the infection along the muscle planes. Both of these, two months after operation, are alive and well, getting about on crutches. After we had done about 20 amputations our supply of chloroform and ether ran out. Fortunately we acquired 10 grams of percaine (Ciba) and a small supply of dental novocain in ampoules. We improvised a spinal needle

from a Labat 8 cm. local anæsthetic needle. From this point on our worries about a stock of anæsthetics were over. We were in a position also to discover that the usual dental ampoule of 2 p.c. novocain is a perfect spinal anæsthetic in a dose of 6 c.cs., and this in spite of the fact that it contains adrenaline. We even had the impression that the presence of adrenaline minimised the usual after-headache. About 60 amputations were done under percaine intraspinally, 2 c.cs. of 0.8 p.c. being mixed with 8 c.cs. of spinal fluid. This large quantity was found necessary as we worked with no pre-operative sedation. Even so, the patient would wince when the sciatic nerve was sectioned unless we gave him a few whiffs of precious chloroform. About 20 patients were done using 120 milligrams novocain intraspinally. This anæsthetic permitted sectioning the sciatic nerve without pain.

The instruments included a dozen well-worn Spencer Wells forceps, a muscle retractor—improvised from a mess tin—and an abundance of cotton thread. We were reduced to using thread when our small supply of catgut was exhausted and it turned out to be preferable. The only two cases of secondary hæmorrhage that we encountered were in patients where we used chromic catgut. The linen consisted of an assortment of towels which were sterilised by boiling in a weak solution of lysol. Gloves were not used, the surgeon's hands being scrubbed in hot water containing lysol. During the operation the wound and the surgeon's hands were frequently doused with 1/1000 mercury biniodide solution.

The operative site was carefully prepared ; the stinking ulcer was wrapped with newspapers and the whole made water tight, if possible, with sheets of cellophane. The operative site was disinfected by mercurochrome in spirit or any other disinfectant except tincture of iodine, which the skin would not tolerate. The thigh was half flexed and the leg half extended, the heel resting on a box so that the surgeon could reach the popliteal area. Just before commencing the operation the leg was elevated and a Samway's anchor tourniquet was quickly applied round the thigh. When expeditiously performed there was only a minimum of venous congestion and practically no blood was lost when the vessels were severed. Because it saved time, and because the poor condition of the patient would imperil the vitality of a long flap, we adopted a circular cutaneous incision just above the upper border of the patella. Where there was a reasonable supply of subcutaneous fat the deep fascia was dissected from the skin ; otherwise not, and a cuff was folded back of skin and fascia for about 3" anteriorly and for about 1" behind. This gave a flap with a transverse scar behind the stump of the femur. Using a clean knife the bone was denuded of its muscles in four sweeps one inch above the cutaneous incision. The point of the knife was first insinuated into the extensor pouch of the knee joint and the quadriceps was sectioned. Similarly we sectioned the hamstrings medially and the biceps and tensor fascia lata laterally. The point of the knife was then insinuated between the periosteum and the structures in the popliteal fossa which were severed by two or three bold sweeps. The muscle retractor was now encircled about the denuded femur. It required several sweeps of the knife to sever the lower attachments

of the adductor magnus, and the femur was transected at the junction of the lower and middle thirds. At first we used an ordinary carpenter's tenon saw quite successfully, sterilising it in strong lysol solution. Later we acquired a hacksaw which could be boiled. Bonedust was sponged away with biniodide lotion and the retractor removed. Artery forceps were now applied to all transected blood vessels that could be seen, and after some experience we had no difficulty in spotting about a dozen of these, the lumen standing out quite clearly in the middle of a muscle belly or in the intermuscular septa. Generally the popliteal artery and vein were tied together. The internal and external popliteal nerves were sought for and a further inch was removed from each. By this time the tourniquet could be safely removed. Three or four more bleeding points were picked up and it now remained to close the stump. The muscles fell naturally over the end of the bone and a continuous suture of linen from side to side was laid including the fascia lata, muscular fascia and the tendinous insertions of muscles. The wound was again douched with biniodide and the skin was closed with interrupted linen sutures. At first we used a rubber drain. Towards the end of the series we closed the wound without drainage with better results. The duration of the operation was 20 minutes without haste. When the occasion called for haste we could complete the operation properly in 12 minutes.

Amputation below the knee differed in one important detail from the above procedure: no attempt was made to cover the exposed bones with a pad of muscle and fascia. This omission was purely for technical reasons, since it was difficult to free the anterior and posterior tibial musculature and the triceps of the calf sufficiently from the underlying attachments without causing more mangling of these structures than was justifiable. We obeyed the accepted

TABLE 4. *Analysis of Amputation Sites with Deaths.*

Double.				Lower third thigh.			Legs.			Grand total.	
Both thighs.	Both legs.	Mixed.	Total.	Left.	Right.	Total.	Left.	Right.	Total.		
4	1	1	6	40	40	80	11	3	14	100	Cases.
2	1	1	4	14	9	23	3	2	5	32	Died.
2	—	—	2	26	31	57	8	1	9	68	Remained.

convention of cutting the fibula at a higher level than the tibia. The skin was sutured to provide drainage in an anterior-posterior direction.

In general, considering the debilitated state of the patients, their frequently septic skins, the crowded slave conditions of the wards, most of the wounds healed well by delayed primary union. Experience taught us to leave the skin stitches in for three weeks or even longer. Patients who were suffering from dysentery or pellagra showed delayed or absent healing of the wound with, in many instances, suppuration and the breaking down of the suture line, with the result that the case had to be treated as a guillotine amputation. Four of these cases have recently come up for secondary suture and, of these, two have again broken down.

At the moment of writing 32 patients have died out of a total of 100 operated on. As judged by clinical evidence, only one died from surgical causes. This was the case of a patient who was getting about on crutches one month after the operation, the stump being entirely healed. He knocked his stump against a corner of the bamboo slats as he was getting out of bed and broke the wound slightly open. The injured thigh swelled by about a litre above its normal volume and a thin trickle of blood oozed from it. Infection set in and, after repeated hæmorrhages the patient died within four days. At this time the hospital camp was flooded as a result of heavy monsoon rains and we were in no position to deal with the matter adequately. The other cases that died all stood their operations well with practically no operative shock and without untoward results at the operative site. The majority of deaths could be attributed to malnutrition, which showed itself in weakness and refusal to eat, with possibly terminal broncho-pneumonia. Such patients had obvious symptoms of avitaminosis. A significant proportion of the remainder died of amœbic dysentery (there were practically no amœbicidal drugs). Quite commonly a patient would entirely recover from his operation and two months later would develop a new ailment which carried him off.

For example Pte. T. had both legs amputated above the knee two months before his death. With the aid of two transfusions he healed his incision by delayed primary union. One month after operation the camp shoemaker made a special pair of boots for him to hobble about in as soon as his stumps were in condition. He had a large sacral bed-sore which he had acquired long before amputation and which predicament is practically unavoidable in such cases in the circumstances under which patients are housed. About six weeks after his operation when his bed-sore was almost healed and when he had been out for a number of days in a wheelcart he developed a remittent high fever with fleeting evidence of endocarditis. Although the blood smears were negative he was given a course of quinine. His fever went about a week after its commencement leaving him unwilling and unable to eat more than a few eggs a day. He died very emaciated.

The fact that many of our amputation cases died of other ailments (tables 5 and 6) is not remarkable in the nature of things : a patient's resistance must be very low when he is unable to hold in check a small infectious cutaneous lesion, and he has a correspondingly poor prospect of shaking off any other serious ailment.

TABLE 5. *Causes of Death.*

Debility.	Amœbic dysentery.	Pneumonia.	Pneumonia and dysentery.	Cerebral malaria.	Cellulitis of buttock.	Secondary hæmorrhage.	Total.
13	12	3	1	1	1	1	32

TABLE 6. *Period elapsing between Operation and Death.*

Up to 4 days.	Up to 1 week.	Up to 2 weeks.	Up to 3 weeks.	Up to 4 weeks.	Over 4 weeks.	Total.
8	6	9	3	3	3	32

SUMMARY.

A series of over 100 cases of tropical ulcer that came to amputation is described with a brief discussion of the value of simple Listerian antisepsis under conditions that even Lord Lister did not have to contend with. Several treatments of tropical ulcers are discussed.

THE NATURE OF STARVATION AMBLYOPIA.

BY

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[Written at Nakom Paton in December, 1944.]

A

A SURVEY has recently been completed of all cases complaining of dimness of vision at present in this hospital. The survey was carried out in the following manner : The eye clinic medical orderlies in each block called for a return from every wardmaster of patients complaining of this symptom. These patients were paraded at the eye clinic and classified under the following headings :

- Group 1. Inactive avitophthalmia of mild degree.
 2. Inactive avitophthalmia of severe degree.
 3. Active avitophthalmia of mild degree.
 4. Active avitophthalmia of severe degree.
 5. Other conditions—viz : i. Presbyopia.
 ii. Cataract.
 iii. Corneal ulcer.
 iv. Nephritis.
 v. Conjunctivitis.
 vi. Refractive error.
 vii. Accident.

6. Fit.

Under this system 409 cases were examined and an analysis was seen to be summarised as follows :

Group 1.	31
2.	90
3.	72
4.	84
5. Presbyopia	48
Cataract	9
Corneal	
ulcer	13
Nephritis	1
Conjunctivitis	5
Refractive error	39
Accident	3
6.	14

Thus we get a total of 277 avitophthalmia cases, 118 other conditions and 14 who apparently came along to see what was going on.

Group 5, or 'other conditions' cases mostly would benefit if they were supplied with correct spectacles. However, their condition should not deterior-

ate greatly in the ensuing months. A certain number will benefit by operative treatment carried out in a well equipped clinic. Some delay should not adversely influence their condition. The other patients were, as is seen above, grouped into inactive and active avitophthalmia. The former implies that some damage has been sustained by the retina, usually about two years ago, but now the condition is stationary and no symptoms other than inability to see are present. In the active group the condition appears to be still progressive and the patients complain of other symptoms as well as being unable to see normally.

Let us now consider the picture of the disease avitophthalmia as it presents itself. Patients suffering from this disease usually give the following history :

- A.
 1. Pain in the eyeballs.
 2. Headaches, usually over the forehead, worse after close work.
 3. Lacrimation to excess, worse after close work.
 4. Heaviness of the lids, made worse by close work.
 5. Desire to shut the eyes and rest after close work.
- B.
 1. Blurring of vision in daylight.
 2. No interference with vision in moonlight.
 3. Change in colours of print after reading for short time.
 4. On closing the lids after reading, sometimes they see flashes of coloured light.
 5. Photophobia is usually present and frequently severe.
 6. After reading a short while the print seems to run together and occasionally a double impression is received.
 7. On looking at a long word the centre often appears to be missing.
 8. Some patients show inability to fix their eyes and even a rolling nystagmus may be seen.

The past history includes malaria, dysentery and deficiency, but not sufficiently clear cut to point to one deficiency as the cause of the disease.

The above symptoms fall easily into two groups :

A. Symptoms of eyestrain.

B. Symptoms of retinal damage.

A. In addition to the above symptoms, on examination, the patients show :

1. Conjunctival injection. This in severe cases tends to become circumcorneal in distribution, similar to that seen in iridocyclitis.

2. Easy fatiguability of the ciliary musculature. This is measured, each eye separately, by asking the patient to read print out aloud. The book is held at the patient's near point and the reading is stopped when the patient is unable to read any more and he complains of marked increase of the symptoms of eyestrain. This was specifically examined in 6 cases. Three of these cases had symptoms and signs of B₁ deficiency, but none referable to the eyes. In five cases the ciliary exhaustion time varied from one minute to five. In the sixth case it was impossible to estimate this as the patient was unable to read owing to central scotoma. After the administration of vitamin B₁ (thiamine).

17,000 international units over a period of 13 days, the exhaustion time increased 33·3 p.c. to 500 p.c. In all cases complaining of symptoms of eyestrain the symptoms were materially improved by the administration of thiamine. After the course of thiamine, it was noted that the inflammation of the conjunctiva had subsided to a large extent.

B. Further examination of retinal damage was carried out as follows :

1. Visual acuity tests. All cases have reduced visual acuity, both for near and distant vision.

2. A fusion test. This was done with a small instrument which has two vertical lines drawn upon it. These lines may be approximated and the patient is asked to state when the two lines become one. Usually the lines are fused when they are some millimetres apart.

3. Colour vision tests : (a) by means of coloured wools. The patients confuse the colours in matching ; (b) by means of a coloured chart. When the patients are asked to identify colours they usually display hopeless confusion ; (c) by perimeter with coloured dots. Usually the colour of the green dot is stated to be blue and the visual fields for these colours are greatly reduced.

4. Also in longstanding cases the pupil tends to be dilated slightly more than normal and the patients state that on looking at anything there is a sense of part being absent. For example, when one of the patients looks at a person's face, frequently the nose is missing. This indicates there is a macular defect.

As the patients see well in moonlight and also as central vision is usually most affected, it would appear that the lesion in the retina is confined to the cones.

DISCUSSION.

From the foregoing it is obvious that cases of avitophthalmia exhibit the following phenomena :

1. Rapid exhaustion of the ciliary musculature. This condition is improved by the administration of thiamine.

2. A lesion of the receptor mechanism of the light-adapted eye, i.e. the cones.

Now, if we subscribe to the Ladd-Franklin theory of colour vision, certain conclusions can be drawn. The Ladd-Franklin theory states that there is a photo-chemical substance in the retina which is dissociated by light of varying wave lengths. This substance, before dissociation, stimulates the cones to give the sensation of white-grey. On partial dissociation it first gives the colour sensations of yellow and blue and further dissociation may take place in the yellow to give red and green.

It is interesting to note that patients, if able to read, state that they, after a period, get the sensation that the print has changed to green or yellow. Also, if after close work they shut their eyes, they get flashes of colour. Now, if the amount of photosensitive substance was deficient while the patient is reading, it is reasonable to assume that after a time insufficient is present to re-associate to give the black sensation and so the above colour effects are produced.

EFFECT OF EGGS

<i>Before Experiment.</i>					<i>1st Period (10 days).</i>			
<i>Case number & Duration.</i>	<i>Colour Vision.</i>	<i>Visual Acuity.</i>		<i>Fusion Test. mm.</i>	<i>Colour Vision.</i>	<i>Visual Acuity.</i>		<i>Fusion Test. mm.</i>
		<i>Near.</i>	<i>Distant.</i>			<i>Near.</i>	<i>Distant.</i>	
1. 5 months.	Poor.	R. 5 L. 5	3 4 -	1 1	Still confused.	5 5	4 - 3	0.75 0.5
2. 14 days.	Very confused.	R. 4 L. 4 +	2 4 -	2 0.5	Still very confused.	5 5	2 4	0.5 0.5
3. 5 weeks.	Very confused.	R. 3 L. 3	1 2	2.5 —	Still poor.	3 4 -	1 2	1 1
4. 8 months.	Very confused.	R. 2 L. 2 -	2 + 3	8 3	Appendicectomy, post-operative			
5. 3 months.	Very confused.	R. 1 L. 1	1 1	8 9	Slight improve- ment.	2 + 2 +	2 2	6.5 5.5
6. 5 months.	Very confused.	R. 2 L. 2	1 —	7 20	No improve- ment.	3 2 +	1 + 1	2 15
7. 4 days.	Slight confusion.	R. 5 L. 5	3 3 -	0.25 0.25	Bacillary dysentery.			
8. 4 months.	Very poor.	R. 1 L. 1 -	1 —	1.5 0.5	Very poor.	2 - 1 -	1 —	0.5 0.75
9. 2 months.	Very poor.	R. 4 - L. 4	1 + 2	2 2	Very poor.	4 4	2 2	2 2

ON AMBLYOPIA

2nd Period (20 days).				3rd Period (30 days).			
Colour Vision.	Visual Acuity.		Fusion Test. mm.	Colour Vision.	Visual Acuity.		Fusion Test. mm.
	Near.	Distant.			Near.	Distant.	
Each improved. Only right correction with green.	R. 5	4 -	0.25	Patient left camp.			
	L. 5	4 -	0.25				
Improving. Green still refused.	R. 5	2 +	0.5	Much improved.	5	2 +	0.25
	L. 5	4	0		5	4 +	0
Some slight improvement.	R. 4	1	1	Much improved. Able to identify green.	4 +	2	0.25
	L. 4	2	0.5		4 +	2	0
Pneumonia and bacillary dysentery.				Fair	4	4	1
					4	4	2
Slight improvement.	R. 4	4	1.5	Much improved.	5 -	4 +	2
	L. 4	4 -	2		5 -	4 +	0.75
Slight improvement.	R. 4 +	2	1	Much improved. Able to identify green.	4	2	0.5
	L. 4	1	2		4	1 +	1
				Normal	5	5	0
					5	4 -	0
Slight improvement.	R. 2 -	1	1	Much improved.	2 -	1 +	0.5
	L. 1 -	—	0.5		1	1 -	0.5
Each improved.	R. 4	2 +	1.5	Practically normal.	4 +	3	1.0
	L. 4	2 +	1.25		4 +	3	0.75

Furthermore, if it is postulated that in the associated form this photochemical substance exerts a protective effect on the cones, when this substance is removed, conal damage would result. This is borne out as the earliest cases of avitophthalmia complain of the above colour changes, also photophobia. In other words the light is inimical to the eye. As visual purple, the photo-sensitive substance for the rods of the retina, is dependent on the vitamin A content of the diet, it is reasonable to assume that visual violet or the photo-sensitive substance for the cones is also dependent on a specific substance in the diet.

With this in mind, thiamine and nicotinic acid were tried by injection without significant results as far as the conal dysfunction is concerned. One early case of the syndrome has responded satisfactorily to ascorbic acid therapy. However, this is not considered to be the specific factor, but rather it points the way to further investigation. One case was given large quantities of egg white in the diet, this being thought to contain riboflavine. However, no change in his condition was noted. The administration of vitamin A & D as haliva oil capsules had no appreciable effect on the disease.

SUMMARY.

277 cases of dimness of vision have been examined in this camp.

The etiology of the disease seems to be bound up with a combination of vitamin deficiencies. The disease resolves itself into two parts.

1. Easy exhaustion of the ciliary muscle which is cured by the administration of sufficient doses of thiamine, at least 1,000 international units intramuscularly per day for 14 days. This was established by experimental exhaustion of the ciliary muscle in 6 cases and their subsequent improvement after thiamine therapy to the extent of 33.3 p.c. to 500 p.c. Also the symptoms of eyestrain, i.e. pain in the eyeballs, frontal headaches, excess lacrimation, heaviness of the lids and tired feeling of the eye, which increased after close work of reading, were alleviated by administration of thiamine.

2. A condition of degeneration of the cones of the retina which itself is probably brought about by the lack of sufficient photosensitive substance for these receptors. The former is shown (a) by lowering of the visual acuity, (b) inability to differentiate objects close together, (c) interference with colour vision. The latter is postulated from the fact that the colour of print changes on reading from black to green or yellow.

Two facts emerge from this :

1. There is a definite relation between eyestrain and vitamin B₁ deficiency.
2. Cases of avitophthalmia are liable to sustain further damage to their cones in bright light and so should not work in the sunlight and should wear dark spectacles. As the retina is central nervous system in origin, any degeneration of the organ is probably permanent, so the prognosis for these cases is bad. In the early progressive cases every effort should be made to supply a well balanced diet failing the elucidation of the specific factor causing the disease.

B.

EFFECT OF A DIET OF EGGS ON NUTRITIONAL AMBLYOPIA.

An experiment was planned as follows :—

Ten patients were chosen who gave amblyopic histories of less than 8 months duration. The following examinations were carried out :—

1. Visual acuity tests for near and distant vision.
2. Fusion tests.
3. Colour vision tests.
4. Perimetry for green dot.

1. Vision acuity. Owing to the lack of a standard test type, substitute charts for near and distant vision were made. These were adequate for comparative purposes. The numbers shown in visual acuity tests are arbitrary numbers of the lines on the visual acuity charts.

2. Fusion tests, carried out by asking patients to state when two vertical lines on a small apparatus become one. This apparatus is made of cardboard and on it are drawn two lines. These can be approximated and the distance between read off. The patient is set at a standard distance facing the machine and asked to signify when he sees one line. The distance between the lines is then recorded. This is done for each eye separately.

3. Colour vision is examined by asking the patient to identify colours on a chart which consists of multicoloured figures with various coloured dots superimposed on the basic colouring.

4. The colour fields for green were estimated on a small semi-circle perimeter made in this camp. The accuracy of this machine is not above reproach but the error is approximately constant over successive examinations.

After the above tests the patients were then each given 10 raw eggs per day for thirty days. The eggs were beaten up, a small amount of sugar and alcohol being added to make the mixture palatable. A third of this mixture was prepared and administered three times per day. It was then drunk in the presence of the wardmaster. At the end of each ten day period the patients were examined and the results noted. During the experiment the patients were encouraged to eat their ordinary rations and allowed to carry on their usual mode of existence.

RESULTS.

During the experiment some difficulty was experienced in maintaining continuity. One patient, after seven days on this high egg diet, developed asthma of such severity that he had to be taken off. A second developed an acute appendicitis in the middle of his course but was able to resume after a few days. A third developed acute bacillary dysentery but was able to carry on with the treatment. A fourth had a relapse of malaria and a fifth was suddenly removed from the camp before the experiment was concluded. Thus, only eight patients concluded the course. On interrogation after the course was completed all stated there was an improvement in their condition; one stated that he was cured, six others said they were virtually cured and the eighth

that there was some improvement in the vision and photophobia and headache were much improved.

Visual acuity. This was seen to improve at each successive ten day period, usually one line over a period of thirty days and frequently more.

Fusion test. This improved in all cases over the thirty days showing successive improvement over each ten day period.

Colour vision. This also improved, but not so quickly as visual acuity. At the end of thirty days usually the patient experienced difficulty with the identification of green only, particularly green stipples on a yellow background.

Colour vision fields. Perimeter charts for green were made in six cases: four of these cases showed a distinct improvement. One case, at the first examination, stated the green dot was white in colour and compared with the normal his fields were reduced. Later, after treatment, he stated that the spot was green and his green fields were then only slightly reduced.

The sixth stated that the spot was blue and after treatment the spot was green. The green field after treatment approximated the blue field before treatment, so some improvement is demonstrated.

The results are summarised in the following table.

EFFECT OF THIAMINE ON CILIARY EXHAUSTION.

		<i>Pain in eyeball</i>	<i>Head- ache</i>	<i>Lacrimation</i>	<i>Heaviness of lids</i>	<i>Ciliary exhaustion</i>		<i>Ergograph No.</i>	<i>Time</i>
						<i>R</i>	<i>L</i>		
						<i>min.</i>	<i>min.</i>		<i>min.</i>
1. Sh.	..	++	++	++	++	1	2	100	3
2. M.	..	++	++	+	++	3	3	65	2
3. B.	..	++	++	++	+	—	—	87	2½
4. H.	..					3	3	89	2
5. Bu.	..					4	4	164	4
6. So.						5	5	20	40

AFTER 17,000 UNITS THIAMINE OVER 13 DAYS.

1. Sh.	..	—	—	—	—	8	8	206	5
2. M.	..	—	—	+	—	6	5	112	3
3. B.	..	—	—	+	+	—	—	260	6'10"
4. H.	..					4	4	402	8
5. Bu.	..					12.5	9	350	6'15"
6. So.	..					25	25	226	4'45"

CONCLUSION.

The results of treating cases of Nutritional Amblyopia of short duration with 10 eggs per day for thirty days were very gratifying; all cases undergoing this treatment showed a distinct improvement and one case was cured.

EUROPEAN INTO COOLIE.

Ps.o.W. Adapt Themselves to the Tropical Villagers' Diseases

BY

Captain K. W. TODD,
Royal Army Medical Corps.

It is well known that the mortality and the disease rate among Ps.o.W. in the Far East were very high. We may have lost 30 per cent in the three and a half years. This article is a general survey of the health of the troops as seen by one medical officer. I was not in Siam in the first half of 1943 when the bulk of the deaths occurred. During the rest of the time, we were living as it were on the edge of a precipice. A high proportion of us would show minor or even grave symptoms of one or more potentially serious diseases ; we had neither the diet nor the drugs to treat our patients adequately ; only in a few places were laboratory facilities available. Yet the threatened calamities did not—except in 1943—occur ; the diseases we experienced became instead part of a picture of general ill-health ; we became stabilized at a level of health not uncommon in the oriental villager or coolie whose life we were in effect living.

After the capitulation in February, 1942, the Japanese concentrated about 45,000 of us in Changi barracks at the east end of Singapore Island. They told us to feed ourselves for the first ten days, after which the rice diet started. Stores of tinned food continued to eke out the rice and lasted until the Japanese re-organized the cold stores in Singapore and issued some meat. The electric supply of these stores had not been out of action quite long enough to destroy the meat. The meat supply lasted till about November when the first Red Cross ship arrived. Our hopes that the shortage was over came to nothing for, instead of regular supplies, we had hardly any more until the end.

The first half of 1943, besides being the time of the cholera and the run of deaths from malaria, beri-beri and phagedenic ulcer in Siam, whither most of us had been transported, was a time of very bad feeding at Changi. Rice and a little fish were practically all we had.

In June, 1943, I was sent to join the rest in the bamboo jungles of Siam. We travelled in railway trucks. It was a week's journey, yet we had not enough room to lie down. We arrived to find the remnants of the labour force, Ps.o.W. and coolies, being transferred back to Malaya. Everybody was sick at some time ; most had some disease all the time. Food supplies which had been hopelessly inadequate were improving ; in some camps, we had actually more meat than we could eat.

With this introduction, let us glance over the total results of this ill-health as I saw it.

Beri-beri.—Though we had cases of neuritic beri-beri in alcoholics at the beginning, precipitated by the 15 mile march to our first camp ; though we had deaths from cardiac beri-beri quite early ; yet a continued deficiency of B₁ brought us less and less disease. One of the cardiac cases was three times sent to a specialist and twice admitted. He had no physical signs, and was allowed to help in the ward ; moving some furniture, he fell dead. This did not encourage us to despise oedematous beri-beri or treat it lightly.

Rarely, however, did we have aneurin to treat it. The rice later in the imprisonment was less highly polished. Rice polishings were available, usually only for frank cases ; it was so unpalatable that it was difficult, even when there was plenty, to get it eaten prophylactically. Yeast preparations, including tablets, were used ; and latterly a few tablets and injections of 300 to 500 units. Green peas of the kind used for sprouting (*tougay*) were issued as a ration in small quantities and sometimes supplemented from Siamese Red Cross stores.

So harmless and variable did the beri-beri appear that we remained in some doubt as to the possibility of confusion with protein deprivation oedema. This was expected much later than beri-beri which hit us as calculated after three months.

Only when peace was declared were we able to clear up this question. For it was then that the Japanese released some American Red Cross supplies. Among the drugs were ampoules of aneurin. I gave one of my worst oedema cases 100,000 units a day intravenously. The rapid relief of the oedema confirmed the diagnoses of avitaminosis.

Pellagra.—Within five months of the capitulation of Singapore a colleague and I found unmistakable signs of early pellagra in 13 per cent of several hundred men. Most had evidence of shortage of both nicotinic acid and riboflavin. Minor evidence was even more common. These men had had much improved rations for two months after a bad three months.

Naturally we were alarmed. The next run of symptoms, the painful feet mentioned as a rarity in the literature of pellagra, came as a veritable epidemic; there were soon hundreds of men pacing the roads of our spacious camp all night. We took this to be a manifestation of spinal cord involvement, and expected still worse signs. They came. Numerous spastic cases were admitted to hospital. There was a series of cases with brisk reflexes, ankle clonus and up-going toes, which interested our specialists and will doubtless be well reported.

Even in 1942 there was evidence of brain involvement, a few cases of mental pellagra. Knowing that 10 per cent of certified mental cases in the States are said to be of pellagrous origin, again we had reason to fear that a large proportion of us might go mad before long.

What happened far from justified our fears. An acute confusional insanity occurred in one of my patients with pellagra, who fortunately died a few hours after onset. But the painful feet cleared up within six weeks on 6 ounces of rice polishings and a little Marmite daily. A few resistant cases had

nicamide injections. Later it was quite common to diagnose incipient spastic paraplegia; painful feet became rare. Either seemed to clear up with a few injections of small doses of B₂, or even without.

Diarrhoea.—This was to be expected in connexion with pellagra. There is little doubt that a deficiency diarrhoea delayed the cure of many of the bacillary dysenteries which were common at the same time. Months afterwards many of the chronic diarrhoeas were cured with grass juices, which would suggest their causation by shortage of minor B₂ vitamin. The Dutch forces, especially those brought up in tropical villages, were using the leaves and fruit of passion flower for the same purpose. Our comparative freedom from diarrhoea in Siam may well be due to the discovery and use of jungle spinach of various species.

Scurvy.—This was expected in four and a half months, as there seemed to be no vitamin C in the food. None, to my knowledge, occurred. The eating of hibiscus leaves, which began early, may account for this.

Conditions of Doubtful Origin, probably Avitaminosis.—A spate of paracentral scotoma, running to 20 per cent of the 5,000 sick left behind on Singapore Island in 1943, alarmed us and will be reported on by the Australian clinic, established for this; its work was past praise.

The point to note, however, is that despite our inability to satisfy ourselves that our treatment was removing the cause of the ensuing visual defects, very few cases were permanently blinded. Many improved and were sent to the Siam work camps where failure of vision was rarely noticed. Night blindness was not uncommon in some camps in Siam, but it cleared up in a few days on transfer to camps with only slightly better diet.

Bacillary dysentery was always with us. In 1942 it assumed epidemic proportions. Here, again, facilities for treatment were extremely poor. An admirable hospital was set up for 1,200 to 1,400 cases. But at one time the magnesium and sodium sulphate was down to 18 ounces for the whole hospital. There was no sulphaguanidine and little if any sulphanilamide.

Facilities for spread of the disease were apparently unlimited. There were flies in abundance and personnel were largely untrained. Yet the epidemic had a very low mortality. Later sporadic cases—such as my own—likewise reacted well to the minimal treatment we had. One man whose stools were choleraic for thirty-six hours had 8 tablets of sulphaguanidine one evening. His morning dose was forgotten but on my visit he said he was well. He was soon on full diet and went to work a few days later at his own request.

Amœbiasis.—Amœbic dysentery was common. A minor research which fell to me demonstrated that the amœba was present at first only in those who had had close contact with native life before the capitulation of Singapore and in the native quarters which some of us had to occupy in Changi.

Again, the disease does not seem to have spread. The number of carriers was said to be high. Here it must be remembered that, when routine examinations were being made to select workers for Siam, amœbic stools were sold by

the infected to the malingerers. One man bought a specimen, divided it into two, and got his money back by selling half!

Apart from terminal infections in patients dying from other diseases—such as malnutrition, tropical ulcers and malaria—amœbic dysentery seems to have killed very few. Not that it was not alarming: there were quite a number of liver abscesses which in the absence of sufficient emetine had to be operated upon. Many of these had not had diarrhœa, let alone dysentery, so far as they could be trusted to remember.

In such circumstances, a jaundice in a known amœbiasis victim gives one pause. We did manage to supply a little emetine for such cases, perhaps a total of grains $3\frac{1}{2}$; but rarely for dysentery as such. One of my jaundice cases relapsed as a moderately severe dysentery. Treatment other than with sulphaguanidine was postponed because he was not going down hill, had not lost his appetite and was not being weakened or robbed of much sleep by going to stool too many times a day. He too survived till the days of peace and plenty—plenty of emetine, yatren and stovarsol.

Emetine treatment of some of the terminal cases was disappointing. Two coolies I was able to try it on both developed œdema immediately. It appears that the dysentery was draining a deficiency œdema. When the dysentery was checked, the œdema recurred.

The small doses of emetine recommended by de Langen and Lichtenstein served us well. This was no surprise to me. In 1934, I had been using such grain $2\frac{1}{2}$ courses in cases negative for amœbæ, and finding it often had a marked tonic effect. My cases were Nigerian lepers, but a neighbouring M.O. was doing the same for Europeans with excellent results.

Malaria.—Experiences with minimal doses of quinine in men who had had numerous attacks of malaria did not alarm those of us who had treated malaria in hyperendemic areas like the Gold Coast. The experiment had not been tried on Europeans before, and it is to be hoped that some good papers will be forthcoming from camps with full laboratory facilities.

We came to regard both benign tertian and sub-tertian malaria as diseases of health. Often the actual illness was a matter of hours. At a college in Africa it had been difficult to prevent scholars from hiding their malaria attacks and staying at work. We rarely found that in Siam work-camps; but, when the Japanese insisted on return to work after three, four or five days, this rarely led to any harm or to early relapse. The shortest intermissions occurred in men who were doing more than twice a coolie's job, and who were often in the rain all day without clothing.

When quinine was not available, a run of fatalities sometimes occurred. At one camp at which I worked there had been two such spells. In the first there were a dozen deaths, in the second, there were none. This was possibly due to the use of a bark known to the Javanese; it seems to have staved off but not cured the malaria. One case ran a temperature of 105° F. daily for five days, but was not given the scanty reserve quinine. He survived.

A Dutch colleague in similar straits made up an injection. He obtained some used battery acid to dissolve his quinine sulphate and gave injections of

about grain 1 per case. During this incident, he had a cerebral malaria who survived on this treatment. He describes sixteen blackwater cases with only two deaths, if my memory serves me. One of his blackwater fever cases had a second attack one day when I was with him ; the next day he had three rigors, each with a new discharge of hæmoglobin ; twenty-four hours later, he travelled with me by train to a base camp, twelve hours' journey away !

Finally, we can report a survival from epileptiform malaria. In that case we had the necessary intravenous quinine. Our staff set up a still for double-distilling water and we kept the patient going with intravenous salines during his thirty-six-hour coma. He had three or four typical epileptic attacks in this time.

In another respect, malaria as seen in Europeans who had had thirty or forty attacks corresponded to native cases in Africa ; that is in respect to the spleen. This was palpable in a large proportion of those who resisted the disease best. It was either grossly enlarged or not palpable—in those who were really suffering from chronic malaria or had malarial cachexia. This is what I have found (but not yet recorded) in malarious children. It seems that the spleen aids immunity. If it fails to enlarge, or continues to enlarge because it is failing to overcome the parasite, the patient suffers. If it succeeds, it settles at about three or four times normal size, and the malaria becomes, as the League of Nations report on it says, a disease of health. Such diseases only cause occasional short interruptions of health and lead to no stunting or cachexia.

Dengue.—Even if we accept de Langen and Lichtenstein's excellent classification of dengue-like fevers into epidemic and endemic dengue, and include the old jungle fevers of various short durations under the latter head, it has to be admitted that dengue in Siam manifested itself as a mild disease. Some cases were typical and of the true epidemic type. But they were distinguished from malaria by slight differences in localization of pains and aches rather than by the severity of these ; and by rapid recovery. The textbook description of a disease needing long convalescence seems to us not to be accurate. Perhaps under ideal conditions we should have sent these cases home to convalesce.

Febrile jaundice was far from rare in Siam, and the consensus of medical opinion, in the absence of laboratory confirmation, was in favour of a diagnosis of Weil's disease : yet it accounted for no deaths to my knowledge.

Prolonged Fevers.—These were usually diagnosed as typhus. It seemed more probable that this was spread by lice than by ticks. The local eschar characteristic of scrub typhus was rarely seen. Again, there were very few deaths.

Lice.—Another surprise was the ease with which lice could be dealt with. In coolie work, there were times when we were all infested. Yet they rarely spread from mat to mat. My neighbour had them when we were lying on overlapping mats, having about 2 feet 3 inches by 6 feet space each to sleep and feed in. I had not a single louse.

One time, when I had them, a couple of boilings of two articles involved on successive days was all I could do. On the third day I picked an adult

louse from one of them, a sure sign the job of disinfesting was far from done. Despite the fact that I could not repeat the treatment, I had no more lice from that day on.

Bedbugs.—Of these we were never free except when we had separate beds. They bred freely and hardly anyone's sleep was disturbed by less than several score of them. They, too, disappeared without routine disinfestation after our departure to Bangkok. Freer use of soap, which we found fatal to them in high dilution, may account for this.

Scabies.—Septic itch was an alarming concomitant of nearly all disease in Siam. We could get no sulphur at all for a long time. One of my colleagues tried 0.5 per cent cresol for it. We used gallons of this (which was poured neat by Japanese into latrines, and begrudged to us for this economical use). This had the most remarkable effect in clearing up the sepsis and relieving the irritation.

Beyond this, we found it unnecessary to go. A dispenser of mine in Sierra Leone once told me he always kept an area of scabies on his body, for fear of developing an all-over infection. The latter I have only seen in soldiers, and one African child, who had had no previous scabies. Our freedom from symptoms of scabies late in our P.o.W. life would suggest, as these other facts do, that the body learns to resist the ecto-parasites, so long as there are a few in residence in some area of the skin.

By this time, however, the Japanese had begun to supply an excellent sulphur suspension, known as sulphur-lye and smelling strongly of H_2S . This appeared to kill the mite when applied once or twice to the affected areas only. Wherever possible we also had clothing and bedding boiled, but it is doubtful whether this was necessary.

Droplet Infections.—Diphtheria came as an alarming epidemic in 1942. It was especially alarming because one of our first cases was only recognized when he died of heart failure from merely turning over in bed. We had no serum. Here must be recounted an accident by which we discovered that our carrier rate was enormous. It had been decided that as we could not deal with the carrier problem, we would not investigate it. By a misunderstanding, the staff of one (non-diphtheria) ward were tested. Some 25 to 35 per cent were positive on culture, if my memory serves me. This had to be hushed up, but the epidemic never assumed the terrible proportions one might have feared.

A corresponding observation made in tropical Africa is that even measles spreads but little there. This may well be due to the fact that in such warm climates, everyone who can sleeps with windows and doors wide open. As Ps.o.W. we had huts open to the air; walls were either non-existent or well short of the roof.

Finally, *Flies.*—The only type of latrine we could make in Siam work-camps depended, as Japanese Army latrines seem always to do, on the larvæ of the bot-fly for disintegration of fæces. When the larvæ were destroyed with cresol, the latrines filled up and stank. It went against the grain to use an

open trench every square millimetre of which was squirming with life, but it is evident that only a minute proportion of the larvæ became adults.

Fly larvæ, but not flies, are apparently essential to some sewage plants in Britain. This was stated in a Parliamentary reply which reached me (in the *British Medical Journal* of May 11, 1945) while I was writing these notes.

Thus the presence of millions of larvæ and very few flies, as we had them in Siam, is not so remarkable as the other observations. Our freedom from dysenteries, when our meal inevitably attracted hundreds of green bot-flies from the latrines, struck us as a matter for surprise and gratitude.

This note would seem incomplete without mention of the mental changes of P.o.W. life. Psychoses were rare. Psychoneuroses and even psychosomatic diseases seemed to have been rarer than in civil life. There was a simplicity, a lack of inner conflict, which explains this; family relationships ceased to worry those who had been embroiled in them. Perhaps a further reason for lack of nervous illness was the frequency of parasitic and dietetic disease to take its place.

There can be little doubt that difficulties of adjustment between returned Ps.o.W. and their home folk will occur; but the resilience of the body in relation to health will as certainly be paralleled by that of the mind to its own health problems. We have shown we could take it, and we still can.

Notices.**ROYAL ARMY MEDICAL CORPS FUND AND R.A.M.C. OFFICERS' BENEVOLENT SOCIETY.**

THE Annual General Meeting of the Subscribers to the Royal Army Medical Corps Fund will take place in the Library of the Royal Army Medical College on Friday, June 7, 1946, at 2 p.m.

The Annual General Meeting of the Subscribers to the Royal Army Medical Corps Officers' Benevolent Society will take place immediately afterwards.

R.A.M.C. HEADQUARTER MESS GENERAL FUND.

THE Annual General Meeting of the above Fund will be held in the Library, Royal Army Medical College, Millbank, S.W.1, at 12 noon, on Friday, June 7, 1946. The Director-General, Army Medical Services, will preside.

R.A.M.C. OFFICERS' "AT HOME, 1946."

AN "At Home" for the Officers, past and present, of the Royal Army Medical Corps, and their wives and families, will be held at the Headquarter Mess, Millbank, S.W.1, on Friday, June 7, 1946, from 4 p.m. till 6 p.m.

In order to make the necessary arrangements and to know the approximate numbers attending, tickets should be obtained beforehand by Officers for themselves and their families from the Hon. Secretary of the above Mess.

ROYAL ARMY MEDICAL COLLEGE, MILLBANK, S.W.1.

OFFICERS and Departments who have PERIODICALS on loan from the Library of the Royal Army Medical College issued prior to January 1, 1946, are requested to return them to the Library. If the continued retention of a particular periodical is essential, it is requested that the Librarian may be so informed.

HARDEN V.C. MEMORIAL FUND.

MRS. HARDEN wishes to express her very sincere thanks and deep gratitude to all those who subscribed so generously to this Fund. It is not possible for her to make any individual acknowledgment—nor, indeed, would such be expected—but she has expressed to the Director-General her very deep sense of gratitude to all those whose generosity has secured the future of her children.

The Fund is being administered by a Board of Trustees who, at present, consist of:—

The Director-General, Army Medical Services—Sir Alexander Hood, *G.B.E., K.C.B.*

The D.D.M.S., Eastern Command—Major General H. C. D. Rankin, *C.I.E., O.B.E.*

The Commandant of The Royal Army Medical College—Colonel C. F. Irvine, *C.M.G., D.S.O.*

Mr. C. G. Randolph of Glyn Mills and Co.

A representative of Messrs. Holt and Co. (Trustees), and Lieutenant-Colonel J. G. Foster, *O.B.E.*, as Honorary Secretary.

As will be seen from the Balance Sheet the amount received in Donations was £10,824 8s. 10d.

A Local Fund has presented Mrs. Harden with the freehold of her house. There are two children, a boy aged 8 and a girl aged 2.

The Trustees have, so far, arranged to undertake the following :—

- (1) To bring Mrs. Harden's income up to £5 a week.
- (2) To arrange for a Memorial Tablet in the Church of St. Botolph, Northfleet ; a duplicate to be placed in the Chapel of The Queen Alexandra Military Hospital, Millbank.
- (3) To pay for the painting of Mrs. Harden's house.
- (4) To alter the lay-out of the garden in accordance with an expressed wish of her husband.
- (5) To undertake the education of the boy who will, when old enough, be sent to a boarding school.
- (6) To defray the expenses of Mrs. Harden's visit to her husband's grave.

The Honorary Secretary has, in course of preparation, a full list of Subscribers which will be circulated in due course. It is now in the hands of the printers.

HARDEN F.C. MEMORIAL FUND.

RECEIPTS AND PAYMENTS ACCOUNT for the period from March 16, 1945, to October 25, 1945.

RECEIPTS.			PAYMENTS.		
	£	s. d.		£	s. d.
To Donations	10,824	8 10	By Cheque book	0	10 3
„ Interest received by Trustees			„ Payments made by Trustees :		
—£9,500 3% Savings Bonds 1965/75		9 17 3	Stamp on Deed of Appointment of Trustees ..	0	10 0
			Allowances to Mrs. Harden :		
			12 weeks at £2 per week ..	24	0 0
			„ Investments made by Trustees :		
			£9,500 3% Savings Bonds 1965/75	9,500	0 0
			„ Cash at Bank :		
			In name of Fund .. £1,111 12 4		
			In name of Trustees .. 197 13 6		
				1,309	5 10
	10,834	6 1		10,834	6 1

We certify that we have prepared the above Account from the Books of the Harden F.C. Memorial Fund, and from information furnished by Messrs. Holt & Co., Trustees. We have verified with the Bankers the correctness of the Cash. (Signed) EVANS PEIRSON & Co.,
February 26, 1946. Portland House,

73, Basinghall Street, London, E.C.2.

NATIONAL ASSOCIATION FOR THE PREVENTION OF TUBERCULOSIS.

VACANCY.

A DOCTOR is being appointed to conduct medico-social research survey in the Gold Coast Colony, who will require a medical orderly to accompany him. The orderly should have sanatorium, hospital or laboratory experience, and will be required to travel with the doctor throughout the Colony and assist generally in medical administration, clerical work, keeping of records, etc. The enquiry will last at least twelve months, commencing in the autumn of this year. The salary will be £450 per annum, plus subsistence, and return passage to the United Kingdom. Applications with copies of recent testimonials should be sent to the Secretary-General of the Association at Tavistock House North, Tavistock Square, London, W.C.1. before May 31, 1946.

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THE problem of depressed metabolism is, of course, very frequently met with in general practice, particularly in the case of convalescence.

It is seldom, however, that a practitioner wishes to resort to such drastic methods of raising the metabolic rate as intravenous injection of thyroxin, or the oral administration of compounds of the nitro-phenol group. Indeed, both these measures are usually contra-indicated, owing to the fact that either is liable to involve interference with the normal mechanism of the body.

For this reason the practitioner generally prefers to prescribe certain stimulating foods such as meat extracts, soups, and home-made broths.

It is a matter of some importance, therefore, to know that one of the accepted meat

preparations is outstandingly effective in raising the metabolic rate. It is Brand's Essence.

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Accordingly, Brand's Essence may be prescribed with confidence for cases of lowered metabolism. It has a further advantage in that it stimulates the appetite and will be found palatable when other foods are distasteful.



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Tuberculin, P.P.D., is prepared by growing the tubercle bacillus on a synthetic medium with subsequent purification. It thus differs from Old Tuberculin in that extraneous proteins are eliminated whilst the substance responsible for the specific reaction is retained. The elimination of this extraneous protein improves specificity and increases the accuracy of quantitative testing.

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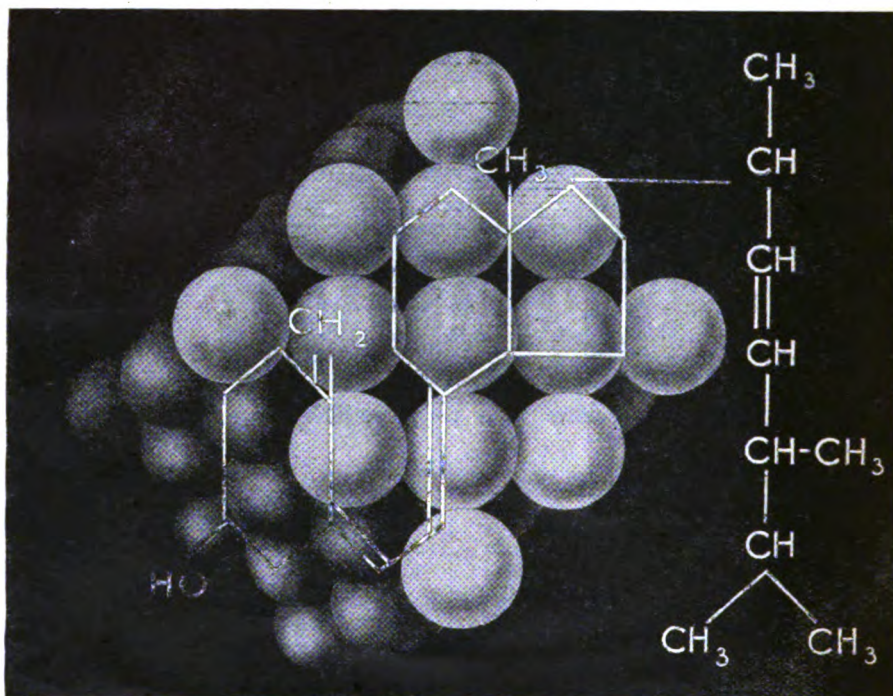


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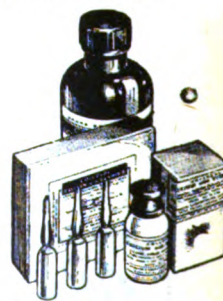
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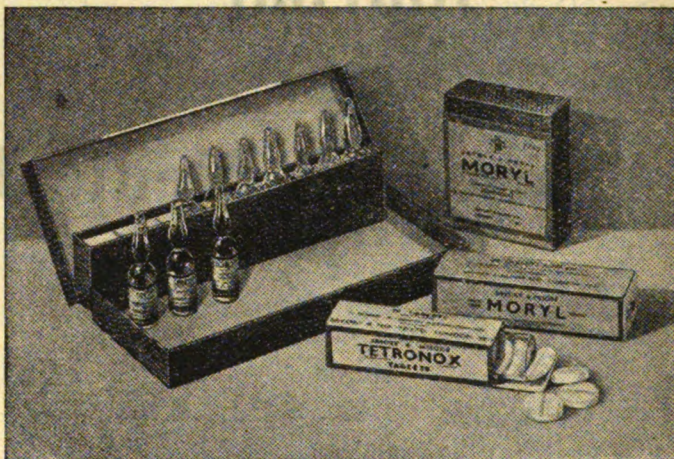
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Original Communications.

TRANSFUSION OF DEFIBRINATED BLOOD IN P.O.W. CAMPS AT CHUNGKAI AND NAKOM PATON, THAILAND.

BY

Captain J. MARKOWITZ, M.B.E.,
Royal Army Medical Corps.

FOREWORD.

A PAPER written by Lieutenant-Colonel E. St.Clair Barrett and Captain Markowitz on their work at Chungkai was, presumably, discovered by the Japanese and destroyed. In the following paper Captain Markowitz deals, primarily, with the work done at Nakom Paton with occasional references to Chungkai.

Barrett and Markowitz were confronted, at Chungkai P.O.W. camp, with a situation where 10,000 patients urgently required treatment when there was a total lack of supplies. Thousands of these patients were in obvious need of blood transfusion so they decided to administer defibrinated blood. They used a few bits of stethoscope tubing and glassware out of which they made a simple gravity apparatus. The results were unexpectedly gratifying as will be seen in the following paper.

Defibrinated blood has long ceased to be used in general medical practice, first, on account of inconvenience and, secondly, because the material has frequently a toxic action, depending on a variable number of factors, including the time elapsing between preparation and administration, and the state of the donor's blood, for example, whether it was collected soon after a meal or after a period of fasting. Moreover, defibrination removes valuable fibrinogen

from the blood. Failing something better, however, and particularly under the conditions of a Prisoner of War Camp—possessing neither supplies of citrate nor facilities for making pyrogen-free distilled water—the method had, in the conditions described, a very great value.

The account which follows was written at Nakom Paton Camp, Thailand, in August, 1945, no books of reference being available, at the request of Lieutenant-Colonel A. E. Coates, Australian Army Medical Corps, for inclusion in his Hospital records. Dates of papers quoted may, therefore, be inaccurate.

(Editor).

INDICATIONS FOR TRANSFUSION IN P.O.W. CAMPS.

Every Prisoner of War in Japanese hands was starved; some failed to show it, being covered with a layer of œdema fluid. Those who developed debilitating diseases died in droves. We, therefore, worked on the principle that blood is all things to all tissues, being meat to the hungry, blood to the malarious and life-giving fluid to the collapsed and to those losing protein by the discharge of albuminous exudates. It soon became evident that the plasma was at least as important as the erythrocytes. Thus, in malaria, the treatment was specific for the anæmia. It saved many lives in bacillary dysentery, where the evacuations are rich in protein. Phylogenetically the function of the lower colon in dysentery may, not unfairly, be compared to the oviduct of a fowl which coats the ovum with globulin and mucin in its passage to the cloaca. A patient losing twenty dysenteric motions of blood and mucus a day loses far more protein than he replaces on a diet of polished rice. This accounts for the fatal nature of dysentery in the half starved. We have seen tropical ulcers discharge 500 c.c. of pus daily—this is as great a drain on the blood stream as a hæmorrhage of the same volume. To replace this quantity of plasma necessitates a generous diet—milk, meat, liver (Whipple, 1936). It presupposes good digestion and good liver function, the liver being the main source of good digestion and liver function. Patients suffering from pellagra, beri-beri and dysentery, even if well fed, cannot be expected to digest and assimilate their food properly; hence they were transfused in Thailand by the thousand, using defibrinated blood. Many of these patients had been callously used by the Japanese in the construction of the Bangkok-Mulmein railway and, if one also counts the Tamil dead, there is a corpse for every railway sleeper. In the latter half of 1943 the survivors arrived at various hospitals, such as Chungkai, in a pitiable state. They were in the last stages of pellagra, dysentery, tropical ulceration of the leg and starvation. They were ragged or naked. They were not even hungry any more and many were too weak to move their bowels decently. A request for supplies to the authorities, if it did not result in a beating by unfriendly guard commanders, often resulted in merely a friendly lecture on *bushido*, or Japanese chivalry, which our captors delivered with the same fervour as an itinerant preacher in Hyde Park. The Japanese conception of morality evidently is purely tribal.

Shortly after we arrived at the P.o.W. Hospital Camp in Nakom Paton (June 17, 1944) a supply of Red Cross drugs arrived bearing evidence of having been pilfered by the Japanese ; this, nevertheless, sufficed in a large measure to control the dysenteries and the vitamin deficiencies. However, a difficulty arose—supplies of quinine began to run short and for about six months we had to transfuse a total of 840 patients for chronic malaria.

TECHNIQUE OF TRANSFUSION.

Donors had to be free from malaria for the past three months. The possibility of transmitting syphilis was deliberately discounted because of our prolonged incarceration. We had, of course, no means of doing any serological tests but, although we made a point of watching for it, there was never any evidence of transfusion syphilis. Donors were asked to report if they developed malaria within two weeks ; only three out of 1,500 did so and their recipients were given quinine.

A transfusion of defibrinated blood divides itself into four parts from an administrative point of view : (1) Typing the donor and recipient or cross-matching where type sera are not available ; (2) collection of blood from the donor ; (3) defibrination, filtration through gauze and giving the blood ; (4) cleansing the apparatus.

It was impracticable at Chungkai for the transfusion officer, who had other duties, to give all the transfusions himself so several teams of orderlies were trained to do the work. The first, under the command of Lieutenant-Colonel J. Barrett, *D.C.M.*, of the Kedah Volunteer Force, was surprisingly successful. The Medical Officer was, of course, in charge and was consulted for difficult veins and veins that required cannulation. Later, when Colonel Barrett was removed by the Japanese from Nakom Paton, Sergeant F. E. Licence, *R.A.M.C.*, and a team of orderlies took over and functioned very well indeed. The Medical Officer did not need to take a syringe in his hand for over 600 transfusions nor was any cut-down in number necessary. Teams were trained in the obvious manner, very much, in fact, as elephants are trained to haul teak. They were put to work with an experienced team and very soon were quite expert.

We found that about 2 per cent of the British personnel in Thailand were incorrectly typed as to blood group. The usual errors were : (a) Carelessness, as where a C4 was called AB or vice versa ; (b) haste, where a feeble A or B was called O4 by not waiting long enough before reading the slide ; (c) clerical errors, as where an A was miscalled AB or B. Such mistakes are easy to make. Blood typing, like the counting of large sums of money, should be done in duplicate. We recall no errors of typing among the A.I.F.

If one can be sure that the patient and donor are correctly typed there is, practically speaking, no need for cross-matching of the patient's serum against the donor's corpuscles. We often—in about 100 cases—used a known O4 in emergencies without this precaution with no mishap. The value of cross-matching is, of course, in detecting errors of typing. Investigation has failed,

in our hands, to disclose any incident where bloods of the same group were incompatible as shown by the biological test of transfusing the blood successfully. Occasionally serum from a patient with blackwater fever gives irregular agglutination, and patients well under quinine may show a similar reaction. In such, blood from an O4 was always safely given, even when corpuscles were slightly clumped on a slide by the patient's serum.

Typing and cross-matching were macroscopic only.

In over 3,800 transfusions under the ægis of the writer at Chungkai and Nakom Paton there were no fatalities. There were three clerical errors which, however, did not cause permanent damage since the alarming symptoms which immediately developed on giving 50 c.c. made it obvious that something had gone amiss. It became the routine to give 50 c.c., wait a minute or so, and then finish the injection as quickly as the vein would take it. Some might criticize the need for haste. We justify it on the grounds that our technique was not perfectly aseptic, as we worked without gloves and dust was continuously flying in through the sides of the "room." We did not allow this to deter us from giving blood in the "wards," by the patient's bed-side, which involved a walk in the open with the container of blood for about half a mile. However, a request for drip transfusion was always refused as unwise.

TECHNIQUE OF DEFIBRATION.

Blood was received *via* French's needle into a container and stirred with a wooden spatula, much as one stirs sugar in tea. Usually the required volume—500 c.c.—was collected before any clotting had occurred. Stirring was continued vigorously for six minutes after the onset of clotting on the spatula. Since the Japanese had removed our watches (which we might sell and use the money for buying food) this meant that stirring continued while one counted up to 500. The blood was then filtered through sixteen layers of good gauze that had been wrung out thoroughly. The clot on the spatula was wrung against the sides of the container and the extra blood added to the pool. Bubbles of air were expelled, the gauze was given a slight squeeze to get some of the blood out of it and the defibrinated blood was given by a simple gravity apparatus.

CAUSE OF TRANSFUSION REACTIONS.

We refer, of course, to the malaria-like paroxysm coming on half to one hour after the transfusion. After our experience of 3,800 transfusions we believe, with Lewisohn, that the cleansing of the apparatus is the most important single step in their control. All equipment was *immediately* taken apart after a transfusion and washed in changes of well water. A gauze wick was pulled through the tubing and needles were picked free of blood particles. Unless used again forthwith, the apparatus was allowed to dry, the gauze being hung on a line. Otherwise bacterial growth occurred and caused chills. Under ideal conditions sterilization should be done in fresh distilled water; this we were seldom able to do, well water or even pond water being usually

used for boiling our material. Although this was shaken loose and wrung out from the gauze filters, we estimated that 5 c.c. of water was given intravenously with each transfusion. This, perhaps, accounts for some of our reactions. The activation of a chronic malaria probably accounts for many of the others, for we had a much higher reaction rate among chronic malarias than among patients transfused for other diseases.

It is a disputed point whether the chill of a malaria paroxysm is due to the hæmolysis of blood when the parasites are liberated or to the action of toxins liberated by the malaria organisms. We have seen a chill, clinically indistinguishable from a malaria paroxysm, following the injection of 50 c.c. incompatible blood; some hours later there was slight hæmoglobinuria. Hæmolysis of blood *can*, therefore, cause a malaria-like paroxysm. In two instances we have seen patients with blackwater fever who developed chills and an aggravation of their fever following blood transfusion, as if the transfusion of blood provided further pabulum to the hæmolytic process. These considerations raised the question whether some of the reactions following the transfusion of blood might not be due to the slight hæmolysis attending the defibrination. When defibrinated blood settles out, the overlying fluid can be seen to be definitely tinted, corresponding to a hæmolysis of about 1 per cent of the blood cells. However, we have seen an orderly beat the blood like a housewife beats an egg with no subsequent reactions whatever, and we doubt if this amount of trauma to the blood is a cause of blood transfusion reaction. Blood, after all, is designed to suffer trauma being propelled at high velocity through the vasculature and the whole body is continually being jarred and buffeted in ways which must involve trauma to blood. This argument is teleological but, we believe, sound.

TRANSFUSION REACTIONS USING PREPARED PLASMA.

About the middle of July, 1944, we received a mutilated package of American Red Cross supplies. Among other things were sixty-two bottles of desiccated plasma. This was a far more elegant preparation than the bottled plasma we had used three years before in the Malayan Campaign. Unlike the latter, not one specimen evoked chills, although there were two cases of generalised urticaria. During the Malayan Campaign an occasional bottle of plasma evoked a violent and dangerous reaction; in fact the material, which looked all right, behaved as if it were a toxic filtrate owing its sterility to Berkenfeld filtration. If we remember rightly it was prepared in Malaya.

CITRATE, *per se*, AS A CAUSE OF REACTION.

Among the Red Cross supplies were several "Vacoliters" of citrate, all ready for receiving and giving blood. These, although few in number, never evoked chills. An occasional slight reaction followed the use of transfusion ampoules of citrate. We received, also, a one pound bottle of sodium citrate, C.P. This material was used as follows: 2 grammes was aseptically removed from the bottle and boiled for several minutes with 6 c.c. of fresh distilled

water. Blood transfused with this material seldom caused reactions. A bottle of citrate sent to us as a local purchase was found to cause frequent reactions, although used identically; the seal of the bottle was broken when we received it, but the material looked first class and had a "B.D.H." label. However, one discounts the label in the East when the seal is not intact. We discontinued the use of this except for blackwater fever where it is important to give alkali.

It may be added, parenthetically, that the good brand of sodium citrate worked even better when used as a dry powder, 2 grammes being added to the receptacle for receiving blood and being stirred into solution as the blood flowed over it. When removed from the sealed bottle aseptically it could be used as a powder without further sterilization, it being sterile by desiccation. We believe that the use of dry powder is the better way of doing a citrate transfusion. The required amount—2 grammes—could easily be dispensed in sealed ampoules and autoclaved. This would dispose of the bugbear of distilled water in transfusion work; it is more portable and is less expensive. In theory the blood so treated should be about 20 per cent hypertonic above its normal value. In practice it did as much good as was expected of it.

RESULTS OF TRANSFUSION FOR VARIOUS DISEASES.

Anæmia, Non-malarious.—One case of aplastic anæmia was still alive after being transfused twenty times. Each transfusion raised the hæmoglobin by 10 per cent, using Sahli's method. (For N/10 HCl in this method we used gastric juice obtained from cases of duodenal ulcer by stomach tube!) In most cases of anæmia transfusion was the only method possible as we lacked iron.

Chronic Malaria.—Of the 1,452 transfusions, 840 were given for chronic malaria. Patients would frequently be brought in from the jungle with a Hb value of 20 per cent, or less. Transfusion not only improved the anæmia but also lessened the tendency to relapse, as if the transfusion furnished antibodies in addition to hæmoglobin. In this connection we recall some experiments on monkey malaria reported from the Rockefeller Institute in the *Journal of Experimental Medicine*, 1939. The animals were infected with *Plasmodium knowlesi*. The author found that the plasma from chronically malarious animals protected normal monkeys against inoculation with malaria parasites and accelerated recovery from infection in others. While the chief component in immunity towards malaria is phagocytic, *via* the reticulo-endothelial system, there is some humoral immunity, probably of an opsonin-like nature.

It was gratifying to observe the effect of even one transfusion on a patient with chronic malaria. One of the most striking effects was an improvement in appetite. The patients who had left part of their miserable rations uneaten now licked their mess tins and asked for more. (One might add that the eating of rice was never a dull affair to the fastidious for it was always mixed with the characteristic ovals of rat dung; "chicken rice" the natives called it; and what is good enough for chickens should be good enough for primates.)

TABLE I.—BLOOD TRANSFUSIONS GIVEN AT NAKOM PATON FROM MAY 20, 1944 TO AUGUST 18, 1945

DIAGNOSIS	DEFIBRINATED BLOOD													TOTALS
	Anæmia	Chronic Malaria	Dysentery	Malaria- adema	Beri-beri	Pellagra	Blackwater fever	General Debility	Tubercu- losis	Post- operative	Misc. Med.	Diagnosed unrecorded	Bomb Casualties	
Transfused	21	14	38	93	25	105	17	1303
Mild reaction*	—	2	8	6	3	22	4	159
Severe reaction*	12	—	—	2	1	11	—	44
Transfused	5	—	3	6	2	—	—	149
Mild reaction	1	—	1	—	—	—	—	16
Severe reaction	2	—	—	—	—	—	—	6

* A severe reaction was recorded for any reaction lasting for more than half an hour and below that time was recorded as mild. No reaction lasted more than one hour.

Total transfusions accomplished = 1452

TABLE II.—DETAILS OF A SERIES OF 250 CASES IN WHICH TRANSFUSION WITH DEFIBRINATED BLOOD WAS CARRIED OUT AT CHUNGKAI.

Disease	No. of cases	Condition of patient			Much improved			Improved			No change			Died		
		Category			Category			Category			Category			Category		
		A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
Amœbic dysentery	77	19	37	21	3	11	7	27	3	11	1	16	1	28	1	27
Tropical ulcers in connection with amputation	65	18	29	18	8	4	3	23	1	7	15	6	5	43	1	21
Tropical ulcer	45	8	25	12	1	5	—	13	3	5	12	—	37	8	1	21
Avitaminosis	32	4	17	11	—	3	1	12	5	3	10	2	16	9	1	12
Malaria	17	1	9	7	—	2	3	29	4	1	5	1	41	2	3	5
Miscellaneous medical	14	1	12	1	—	—	—	—	—	—	—	—	—	—	—	5
Total	250	51	129	170	12	25	14	20	4	28	67	9	41	6	9	36

Dysentery.—The outstanding complication of amœbic dysentery was hæmorrhage from which a patient not seldom died in spite of repeated transfusion because it was difficult to keep pace with the bleeding. Most of the time, supplies of specific amœbicidal drugs were absent or deficient. Unless such an amœbic patient was transfused early and often, he died. In bacillary dysentery and in mixed cases the usual symptoms were diarrhœa dehydration with toxæmia of varying degree. Such cases were well treated, in the absence of sulphaguanidine, by one or more transfusions, thereby compensating for the starvation and the loss of protein in the motions (bacillary exudate), and permitting the miserable diet of pap rice to accomplish its purpose of keeping these patients alive until they became immune and the bowel regenerated.

Malnutritional Œdema and General Debility.—The diagnosis between wet beri-beri and protein deficiency œdema is not easy. It has been more than once suggested that when rice is polished it loses, not only its B1, but its protein so that both beri-beri and famine œdema develop *pari passu*. This is not the place to discuss this view. In Chungkai we saw thousands of living skeletons, interspersed with bloated bladder-like invalids, many of whom had stinking tropical ulcers; most of them had diarrhœa either pellagrous or dysenteric. If not too far advanced, a series of transfusions caused improvement in general condition and appetite. When the œdema was due to famine the giving of blood provoked diuresis. Usually, however, the anorexia was so profound that, even after transfusion, the patients could not be made to eat. After a few mouthfuls of rice they seemed unable to swallow. When they forced themselves to eat their rations the material was not digested and one could see rice in the stools. In such, irreversible damage had occurred to the processes of alimentation, digestion, absorption and assimilation and transfusion merely delayed death.

Avitaminosis.—Transfusion was of benefit in beri-beri, especially the wet form, and in pellagra; especially if complicated by diarrhœa or sepsis. The diagnosis of sprue was, to our knowledge, never made, the syndrome being classed as pellagra. In Chungkai hundreds, perhaps a thousand, of these patients suffered from huge tropical ulcers. For these a transfusion of blood was given in an effort to enhance resistance and save limbs, with some success.

Blackwater Fever.—Of nineteen patients transfused, only four died. The best time to give a transfusion was found to be when the hæmoglobinuria had stopped and/or the hæmoglobin value had reached 20 per cent.

Post-operative and Bomb Wounds.—Transfusion was used for post-operative surgical shock, which requires no discussion here. In addition it was generously used to encourage post-operative healing of a wound in a patient who was otherwise too debilitated to make the grade. The case of Private A. B. of the A.I.F. is of interest. He was admitted to hospital with amœbic abscess of the liver, which Lieutenant-Colonel A. E. Coates, A.A.M.C., drained abdominally and, later, transpleurally, with the aid of a number of transfusions. In spite of his desperate condition he recovered, only to develop

empyema. A rib was removed and the pleura drained, again with the aid of a number of transfusions. Just when it appeared he was well on the mend he developed intestinal obstruction from a post-operative band. Again a number of transfusions were given, the first while under the anæsthetic. In all, he received twenty-five transfusions, either of plasma or of defibrinated blood. At the date of writing he was quite fit and well.

Pulmonary Tuberculosis.—There were forty two cases of lung tubercle at Nakom Paton. Clinical facilities for treating them with aught save artificial pneumothorax were few. We felt that here, if anywhere, transfusion should do yeoman service; it did not. Nine patients were each given five transfusions of blood at intervals of a few days. Far from doing good, we feel that the progress of their disease was accelerated after a temporary improvement in appetite and well-being. We have no explanation to offer for this disappointing outcome.

SUMMARY.

The author describes a technique for transfusing defibrinated blood which, perforce, was used in the Prisoner of War Camps in Thailand. It had a maximum reaction rate of 13 per cent, many of these being probably malarial paroxysms and not true reaction. Teams trained and supervised by the author performed 3,800 transfusions. In addition, as other medical officers got to know about it, it was used successfully by them in many camps in Thailand. The author feels that this method has a distinct value as an emergency measure and has fewer reactions than the citrate method as ordinarily practised.

ACKNOWLEDGMENTS.

The author is indebted to Lieutenant-Colonel A. E. Coates, A.A.M.C., chief surgeon and Commanding Officer at Nakom Paton Prisoner of War hospital for his encouragement. Under his ægis nearly 1,500 transfusions were performed. The author is also grateful to Lieutenant-Colonel J. W. Malcolm, O.B.E., M.C., R.A.M.C., for fatherly interest and advice and for the many hours he spent in the transfusion clinic.

(Written on August 20, 1945, in the Nakom Paton P.o.W. Camp, Thailand.)

THE LIGHTER SIDE OF INTERNMENT.

BY

Dr. G. A. C. HERKLOTS.

[Received April, 10, 1946].

So much attention has been devoted to the gloomy and depressing aspect of internment camps that the other side of the picture tends to be overlooked. During our forty-three months in the Civilian Internment Camp at Stanley, Hong Kong, it was possible to be happy, active and optimistic in spite of the severe shortage of food, the overcrowded living quarters and the depressing monotony of life as prisoners of the Japanese. To the children Stanley was the world; the cinema, motor-cars, trams and the bustle of city life were things of the dim and distant past. They found amusement in the peculiar waddling gait of the squat flat-footed Japanese soldiers and mimicked their walk. Cakes and sweets were not expected from their parents for they had largely been forgotten. For the small children camp really was home, pathetic as the idea might seem to their elders.

One day I made a brick sparrow trap and caught a sparrow which was put in the pot and shared between seventeen adults. Perhaps unwisely, I taught a small boy the art and within a week there were sparrow traps everywhere. Very few sparrows were caught but many tree pipits and Chinese bulbuls and occasionally a dove, a mynah or other bird. It was a red letter day in the life of a family when the small son came in with a bird, the first meat perhaps for several months. If any rare bird were caught alive it was released, and I remember the distress of one small boy who had found a dead blue rock-thrush in his trap. Often boys would bring their capture to me with the question did I wish to draw it. If I did, then, "When does mother want to cook it?" And, if the answer was, "in half an hour", it meant a hasty pencil sketch and request for a wing and leg for later detailed study. A promise of a copy of the bird book when published for every drawing made from a Stanley bird ensured a steady supply of material.

Perhaps there would be a timid knock at the door of our crowded dwelling room, and on the shout "Come in" there would enter three or four children with some toadstools, a handful of berries, some wild figs or a spray of leaves. "Please uncle, mummy says are these good to eat?" And if the reply was "Yes"—a scamper and the children were away to collect more. On more than one occasion fruits of strychnine¹ were brought me—the plant was common in the camp—and I had to reply that these were not small oranges but fruits containing very poisonous seeds. Other poisonous plants common in the camp included the castor-oil plant, strophanthus² and oleander. The seeds of the castor-oil plant contain a lot of oil and are nice and crunchy but contain in addition a very poisonous compound. One senior Government servant ate a small handful and lived! Unlike the small children he had not asked my advice first.

A diet of a little rice and a more generous allowance of greens is monotonous to the palate and strong-flavoured herbs were eagerly sought. There was a little wild ginger³ growing in the camp—more accurately a wild galangal. The seeds, employed sparingly, could be used for imparting flavour but the young shoots emerging from the ground in the early spring were excellent. They could be candied (if sugar were available), they could be boiled and the infusion drunk as it was or fermented and drunk as ginger wine, or very thin slices could be used for flavouring rice cakes. Other wild edible plants included purslane⁴ and pennywort⁵. One man experimented with *Smilax*, related to the plant from which sarsaparilla is made, and brewed evil-looking but quite palatable drinks from the leaves. Herb tea was prepared from a variety of plants; one was used efficaciously in some cases as a vermifuge⁷. My advice to an anxious mother usually was : “ Experiment on yourself first, and if it works then halve the dose for your son or daughter.” The raw seeds of pumpkins⁶, when available, were also employed for this purpose.

Sometimes for weeks there would be an acute shortage of tobacco and smokers would ask for suggestions as to substitutes. The leaves of wild ginger and of banana were tried by many, as also were those of the sweet potato. The smoking of tea-leaves indoors was strictly forbidden in most Messes. In a happy moment I, a non-smoker, suggested to one elderly man that he should try the leaves of the guava, a member of the myrtle family ; he did, and it soon became the most popular smoke in camp. A tin of guava leaves made a very acceptable birthday or Christmas gift.

For a couple of months each summer a beach was open for bathing—relatively few went, except the children, because it was too exhausting on our low diet. The boys would spend their time trying to catch fish or crabs or collecting shellfish which they would bring to me for naming before cooking. Puffer fish are very poisonous so the children were encouraged to show me their catch. There might be a baby shark, young mud-groupers, green wrasse, terapon or brightly coloured coral fish, some rock oysters, limpets and sand crabs—all very small, but children will eat anything when ravenously hungry. Cuttle fish bones were washed up and were collected for human consumption (not for canaries) and doled out to expectant and nursing mothers with suggestions as to how much to eat to supply needed calcium for the bones of the infant.

In one corner of the camp was a very impure deposit of China clay. This was dug, washed and separated and used for a variety of purposes, as a substitute for kaolin for dysentery cases, as toothpowder (preferable to wood-ashes and soot), and for whitewashing kitchens. In the raw state it was used for marking out large white, or rather pale pink, crosses which the Japanese insisted that we should display to discourage our own people from bombing us !

When soap was scarce, a common occurrence, we used lye extracted from wood ashes, and one ingenious man tried making soft soap from castor-oil extracted from home-grown seeds and lye. Various barks yielded tannins gums and dyes, an indelible ink for marking linen (not that we had any)

and even water-colour paints for there was a wild mangosteen in the camp which supplied a crude form of gamboge. In our gardens amongst the varied and strange vegetables cultivated was Ceylon spinach⁶ which has peculiarly slimy leaves and these were given to patients with peptic ulcers.

Supplies of vitamin C were ample for all requirements, for pine needles⁹ are rich in this substance and a handful washed, chopped up fine and boiled in a little water for ten minutes yields an infusion as rich as the finest orange juice. Those lucky ones who grew peanuts were advised to save all the thin skins surrounding the seeds for this by weight is the richest, or amongst the richest, sources of vitamin B₁ in the world. For our supplies of B₂ we had to depend on a very acid and impure culture of brewer's yeast grown on wheat flour several years old and on soybean residue, left after the soaked seeds had been crushed in a stone mill and the "milk" extracted.

The children would take a very keen interest in caterpillars and beetles and would bring me bizarre specimens for my favourable comment. Unfortunately they did not show so keen an interest in the pursuit of cockroaches, house crickets and bed-bugs which were abundant—not that the inmates of my room would have welcomed with equanimity additions to our already adequate domestic fauna.

RECIPE FOR PINE NEEDLE TEA.

Freshly gathered pine needles are very rich in the anti-scorbutic vitamin C, the absence of which in the diet leads ultimately to the development of scurvy. Three and one half ounces (nearly 3 taels or one handful) of freshly gathered pine needles (*Pinus Massoniana*) contain 80 milligrammes (1,600 international units) of vitamin C; half of this can be extracted by the following method which will provide enough for two adults. Wash the needles in water; it is necessary to rub them together vigorously to remove soot. Chop into small pieces and drop them into a saucepan or kettle containing enough boiling water just to cover them. Boil gently for ten to fifteen minutes. The infusion should be drunk when cool enough.

PLANTS REFERRED TO ABOVE.

- ¹*Strychnos angustiflora.*
- ²*Strophanthus divergens.*
- ³*Alpinia nutans.*
- ⁴*Portulacca oleracea.*
- ⁵*Hydrocotyle asiatica.*

- ⁶*Cucurbita moschata.*
- ⁷*Desmodium triquetrum.*
- ⁸*Basella rubra.*
- ⁹*Pinus Massoniana*

THE AMERICAN ARMY MEDICAL SERVICES IN THE FIELD.

BY

Major-General R. J. BLACKHAM, C.B., C.M.G., C.I.E., D.S.O.

[Received December 18, 1945.]

In 1942 the writer prepared some notes on the American Army Medical Services for the Medical Personnel (Priority) Committee on which he is the Army representative.

In 1944, he visited the Third Army by the kindness of Major-General Paul Hawley, Chief Surgeon, European Theatre of Operations, U.S.A., and this year, thanks to the courtesy of Brigadier-General J. Martin, the Army Surgeon, 5th U.S. Army, he had the privilege of seeing a Medical Battalion in action soon after the victorious offensive was launched on the Italian Front in April last.

It has been suggested that some information about the Medical Service of our Great Ally might be of use to officers of the Corps, therefore my original notes have been brought up to date in the hope that they may be of general interest.

It will be found that there are great and outstanding differences between the American Army Medical organization and our own.

(1) THE MEDICAL SERVICE AT THE AMERICAN WAR OFFICE.

Instead of being a branch of the Adjutant-General's Department the Army Medical Department is a part of the Service of Supply of the United States Army.

This service, known as the "S.O.S."—as the American Army is as fond of initials and short titles as the British and Continentals—embraces what are known in our Army as the administrative services.

The Army Medical Department has at its head the Surgeon-General at Washington, who corresponds with the Director-General of the Army Medical Services at the British War Office, and controls the department.

The administrative medical officers of all formations from Army to Regiment are designated "surgeon"—for instance, an Army surgeon corresponds to Director of Medical Services in our Army, a Corps surgeon to our Deputy Director of Medical Services and a Division surgeon to our Assistant Director of Medical Services.

The American Army in the European Theatre of Operations is divided into combat zones or Army Areas and Communication Zone known as the "Com Z."

The United States Army Medical Department includes not only the American R.A.M.C.—the Medical Corps—but also the following: (1) The Medical Administrative Corps which corresponds to the Quartermasters of the R.A.M.C.; (2) The Sanitary Corps; (3) The Dental Corps; and (4) The Nurse Corps.

Here at the outset is a remarkable difference between the British and American Services. The Royal Army Veterinary Corps of the British Army is an entirely distinct Corps. In the American Army, the Veterinary Corps is part of the Army Medical Department.

The Dental Corps, as in our own Army, is administered by the Medical Corps. The Army Nurse Corps represents our Queen Alexandra's Imperial Military Nursing Service, but wears the same uniform and bears the same badge as the Medical Corps.

The field organization of the U.S. Army Medical Corps has also great and outstanding differences from the British Army organization.

The first of these to strike the visitor are (a) the provision of a detachment of the U.S.

Army Medical Corps which serves *at all times* with each formation of every unit of the American Army, and (b) the existence of a regimental medical service.

(2) THE REGIMENTAL MEDICAL SERVICE.

In the British Army there is no regimental medical service.

In wartime, R.A.M.C. officers are attached to units but no "Other Ranks" of the R.A.M.C. serve as integral parts of the fighting units.

In the American Army the Army Medical Corps provides detachments for not only each regiment and separate battalion but for every formation down to the platoon.

These medical troops train with their units and go into action with them. They correspond more or less with the stretcher bearers of the British Army who are combatant soldiers of the unit trained by the unit medical officer. In the United States Army the word "litter" is used instead of "stretcher" and the medical troops form the litter squads for the formation to which they are attached.

They are affectionately known as "Medics" and their services are highly prized by their combatant comrades.

I talked to infantry commanding officers and they said they would not be without their "Medics" "for anything."

These detachments of medical troops form the "Other Ranks" of a very complete regimental medical service.

The regiment in the American Army corresponds to our brigade.

At the head of the regimental service is the regiment surgeon who has no analogue in the British Service.

He is provided with one or more commissioned assistants and the battalion medical officers are under his direction for medical purpose.

There is one medical officer and one officer of the Medical Administrative Corps to each battalion of about 900 men.

In the British Service the O.C. the field ambulance attached to a Brigade acts as senior medical officer but the unit medical officers of the Brigade serve directly under the A.D.M.S. of the Division.

(3) THE MEDICAL SERVICE OF AN AMERICAN DIVISION.

Each Division has a Division surgeon.

The Division surgeon has a larger staff than a British A.D.M.S.

He has, for instance, a medical inspector, who is a specialist in field sanitation and epidemiology and supervises matters of preventive medicine, a Division dental officer and a Division veterinary officer.

The Division surgeon has at his disposal a medical battalion which corresponds to the three field ambulances of a British Division.

The medical battalion is composed of three collecting companies and one clearing company. It has thirty-five officers of which twenty-five are medical officers distributed as follows:

Headquarters and Headquarters Detachment	..	3
3 Collecting Companies	.. .. .	12
1 Clearing Company	.. .. .	10
		<hr/>
		25

In action, the clearing company of the Division forms a clearing station which corresponds roughly to the old main dressing station formed by our field ambulances prior to the reorganization. 1942

During my visit to C.M.F. I had an opportunity of seeing its medical battalion in action with the 92nd Division of the U.S. Army which was originally an entirely negro Division.

It had been reconstituted with one white and one negro regiment and one regiment composed of American-born Japanese. It will be remembered that American regiments correspond to brigades of our Army.

The Division surgeon was white but the commanding officer of the medical battalion was a negro Lieutenant-Colonel.

We visited a collecting station formed by one of the collecting companies of the Division which corresponded to a British advanced dressing station.

It was situated within three miles of the front line and I was shown round by a negro captain of the U.S. Medical Corps who clearly knew his job.

Wounded, white, negro and Japanese, were being skilfully attended by negro medical officers and personnel.

I also had an opportunity of visiting a clearing station formed by the clearing company of the medical battalion.

This formation corresponds roughly to the old British main dressing station with, however, the great difference that it has a platoon of a field hospital attached to it.

This platoon functions in a similar way to the new British advanced surgical centre but is much larger as it can hold 134 patients in cots, i.e. wooden camp beds which take the place of the metal beds carried by the British field dressing stations and field surgical units.

(4) THE MEDICAL SERVICE OF AN AMERICAN ARMY.

The Army surgeon has at his disposal a varying number of field hospitals and evacuation hospitals and a large convalescent hospital of a thousand beds.

In the Third Army I saw 28th Field Hospital in command of Lieut.-Colonel Ensey, M.C. His hospital consisted of 400 beds augmented to 600 beds and used as a rail holding unit.

The American field hospital is equipped for 400 patients and has 14 medical officers, 8 administrative officers, 18 nurses, 2 Red Cross workers and 187 other ranks. It is divisible into three platoons, each platoon capable of holding 134 patients on cots.

The field hospital is described as "semi-mobile" and cannot move without additional transportation.

It has the following transport :

6 Ambulances	1 trailer, bath unit
4 2½ ton trucks	3 " ¼ ton
4 Jeeps	1 " 1 ton
1 ¾ ton truck, weapon carrier	3 " water carrier

15

As pointed out above, platoons of field hospitals form the American equivalent to our advanced surgical centres.

Instead of the British field dressing station with two or three surgical teams the American advanced surgical centre is formed by adding to a clearing station a platoon of a field hospital which has "beds" for 134.

The "beds" used by the field hospital are made of wood and comparable to camp beds. They are light but do not stand rough usage as well as our British beds.

When a platoon is moved to a clearing station for an advanced surgical centre the Army surgeon arranges for 15 × 2½ ton trucks with 1 ton cargo trailers for each platoon. This transport moves equipment and personnel. The Army surgeon also sends one surgical team composed as under : 1 surgeon, 1 assistant surgeon, 1 nurse, 1 anaesthetist, 2 other ranks, surgical technicians.

No transport is assigned to American surgical teams. The unit to which they are attached provides transport to their next assignment.

An Army surgeon has a large number of surgical teams at his disposal, viz. 24 general surgical, 37 special teams including : Orthopaedic, neuro-surgical, maxillo-facial, shock, gas,

now being used as shock, and miscellaneous, including eye, and 3 X-ray teams made up separately.

The only kind of team which is completely mobile is the X-ray team.

Army Convalescent Hospitals.—The Army surgeon of the 5th Army showed me his convalescent hospital which was located in four hotels of an Italian Spa in his Army area.

The Spa was beautifully situated on the slopes of the Apennines and the military patients took the ferrous alkaline waters and used the hot bath.

The hospital was organized for 1,000 patients but there were 2,000 in the unit at our visit. About fifty officer patients had been allotted a special hotel and messed with the medical officers.

The hospital carried out the function of a British convalescent depot but had a complete medical and surgical staff.

Officers and other ranks are kept about a week and I was assured by the Army surgeon that a large number return to full duty.

We have nothing quite similar to this formation in the British Army areas.

Hospital Trains.—The U.S. hospital train has the same capacity as a British train. Indeed, of 27 trains operated from chief surgeon's office at the end of 1944, 24 were British and 3 had been taken over in France. The medical officers of each train consist of a Major with one Captain and two Lieutenants.

When I visited Paris a portion of the Gare St. Lazare had been taken over and all trains operated through Paris.

Motor Ambulance Convoys.—In the British Service motor ambulance convoys are R.A.S.C. units under the operational control of Corps D.Ds.M.S.

In the U.S. Army they are styled medical ambulance battalions motor and remain under the command of a Medical Corps officer, but out of 18 officers only 4 are medical.

Medical Gas Treatment Battalions.—These are large units which accompanied the Expeditionary Force to Europe.

As they are not required for gas cases they are split up and employed as medical holding units on air-fields and air-strips.

The Sanitary Corps.—This useful formation is not concerned with ordinary hygiene duties but consists of sanitary engineers, chemists and scientific workers, such as entomologists, bacteriologists and statisticians.

Officers of the Corps, who are chemists, are frequently employed as dietitians in general hospitals. The officers wear the same badge as the Medical Corps with an enamelled letter "S" superimposed.

Field Hygiene.—Medical sanitary companies are large units which may be commanded by an officer of either the M.C., A.M.C. or Sanitary Corps.

They are very active formations. At my visit notices proclaiming that the water supply of Third Army H.Q. was unsafe were ubiquitous and Lister bags with chlorinated water were installed in all messes.

Dental Service.—Each unit has its own dental service. The dental officers are assistants to the unit surgeon of each formation. They have enlisted assistants who are trained in general duties of medical soldiers and are available in combat for any medical duties.

Veterinary Corps.—Veterinary officers act as assistants to the surgeon of the formation to which they are attached.

In addition to the care and treatment of animals, veterinary officers are responsible for the supervision of stables and picket lines and the inspection of meat and all other foods of animal origin, such as milk and butter.

At the conclusion of a visit to B.L.A. in 1944 the writer was invited by Major-General Paul Hawley, the Chief Surgeon of the European Theatre of Operations, to visit the American zone of operations.

General Hawley's domain was the entire European Theatre of Operations. He acted in a dual capacity in that he was Chief Surgeon of the theatre and of the Communications Zone as well. His jurisdiction of the Medical Services extended from the front lines to the outloading of hospital ships.

His office was located in one of the avenues leading from the Place d'Etoile.

A portion of the avenue had been roped off and was guarded by Military Police. Of course, traffic through this portion of the avenue was diverted.

The office of the chief surgeon is a very extensive organization divided into fourteen divisions under eleven Colonels of the Army Medical Corps, a dental full Colonel, a veterinary Colonel and a Lieutenant-Colonel of the Nurse Corps, viz. :

Executive Officer	Operation Division
Dental Division	Personnel Division
Gas Casualty Division	Preventive Medicine Division
Historical Division	Professional Services Division
Hospitalization Division	Public Relations Division
Medical Records Division	Supply Division
Nursing Division	Veterinary Division

Thanks to General Hawley I saw a number of hospitals in and around Paris and was impressed by the following features :

(a) *Office Accommodation*.—The office accommodation is more elaborate than in British hospitals.

Each officer has on his desk, facing visitors, a painted block giving his rank, name and appointment.

This is a very convenient arrangement and is used in the offices right up to the forward area of the Armies.

(b) *Wards*.—The wards were bright and cheerful. In many of the hospitals German bedsteads and even bedding had been taken over and was being used instead of the hospital's own beds and bedding which were kept ready for a sudden move.

(c) *Services*.—Instead of the medical and surgical divisions of British hospitals, the Americans have what are called "Services."

For instance, the opposite number of our Officer i/c Surgical Division is called Chief of Surgical Service.

This Service is divided into five sections : (1) Orthopædic ; (2) septic ; (3) urological ; (4) general ; (5) E.E.N.T.—the additional " E " may be unfamiliar. The Americans group the eye with the ear, nose and throat department but there are, of course, specialist eye surgeons.

Some hospitals have special features, such as chest wounds, head wounds and neuro-surgery.

(d) *Ranks*.—General hospitals are commanded by full Colonels as in our Service, but specialists do not carry the rank of Major as in the R.A.M.C. Many of the American specialists I saw were only Lieutenants and did not seem to be less looked up to by their brother officers on this account. Since my visits, however, qualified officers have been promoted to the rank of Captain, even though no T/O vacancy existed.

(e) *Dieting in Hospital*.—Great attention is paid to dieting in American hospitals and it is under the control of a non-medical officer who is a dietitian. In one hospital I visited the dietitian was a 2nd Lieutenant of the Sanitary Corps and a professional chemist in " Civvie Street."

(f) *Central Issue Depot*.—All general hospitals have organized a central issue store, usually in charge of a nursing officer, who supplies on demand sterile packages for use in the wards which contain all materials necessary for intravenous injections, catheterization, lumbar punctures, bleeding tonsils, etc. When finished with the materials are returned to the depot to be cleaned, sterilized and reconstituted.

(g) *Laundries*.—Each general hospital has a laundry and I was pleased to note that the machinery was British!

One hospital went to the refinement of ironing sheets with French civilian labour.

(h) *Laboratories and Libraries*.—Laboratory material is provided on a generous scale and a library of reference books is part of the hospital equipment.

(i) *Transport of General Hospitals*.—I was much impressed by the amount of transport provided for American general hospitals, viz.: 5 motor ambulances, 5 jeeps, 2 command cars, 5 2½ ton lorries, 4 weapon carriers.

The Nurse Corps.—The Nurses of the American Army are called "nurses" and not "nursing sisters" or "nursing officers" as in our Army, but from June last they held substantive rank and are addressed by their military ranks. They wear a simple but effective indoor uniform of striped brown and white material. Their outdoor khaki uniform is familiar in the London streets.

They are efficient, very keen on their nursing work and their duties are executive rather than supervisory.

They salute, and are saluted, in the corridors of the hospital but seem to be taken rather as a matter of course in the wards and seem less referred to than the nursing officers in British hospitals.

I saw a general hospital on the move from Normandy to the Third Army area and was impressed by the battle dress worn by the nurses which was exactly similar to that worn by the medical officers.

They said it kept them warm under very adverse weather conditions and they were evidently enjoying the experience of active campaigning.

Nurses are included in surgical teams and are used right up to clearing stations in the field hospitals.

The nurses wear the same badge as the Medical Corps with an enamelled letter "N" superimposed.

In the field hospitals they are employed in their professional capacity in nursing and likewise used as anaesthetists.

They have their own Messes and are regarded in every way as officers of the medical department. They salute officers senior to themselves in the corridors of hospitals.

Evacuation of Wounded.—The collecting companies of the divisional medical battalions convey the wounded to clearing stations formed by the clearing companies of the battalions. From the clearing station the wounded are transferred to the attached platoon of a field hospital if they require immediate operation. If immediate operation is not required they are conveyed direct to the evacuation hospital.

These evacuation hospitals correspond to our casualty clearing stations, but are very much larger units. There are two kinds, 400 bed and 750 bed.

I saw No. 104 Evacuation Hospital at Nancy. It was commanded by Colonel R. Thompson and had 400 beds but could develop to 730 beds.

It was described as "semi-mobile" with the following transport: 20 2½ ton trucks, 3 ½ ton trucks, 1 command car, 3 Jeeps, 1 weapon carrier, 1 water tank, 700 galls., 2 tank trailers. With this amount of transport it requires three or four trips or additional transport provided by the Army to which it was so attached in order to move.

Its equipment was on a very generous scale, for instance, it carried a library of fifty medical and surgical books of reference.

The staff consisted of:

Medical officers	..	..	..	..	32
Dentists	..	..	..	..	2
Administrative officers	..	..	..	..	6
					—
					40

The registrar is a M.A.C. officer—that is a quartermaster—as in our own Service.

The Surgical Service includes : 1 neuro-surgeon, 1 orthopædic surgeon, 1 thoracic surgeon, 1 maxillo-facial surgeon, 1 neurologist, 1 ophthalmologist, who does ear, nose and throat work. Medical side : 1 general physician, 1 radiologist, 1 psychiatrist.

I also saw an evacuation hospital of 750 beds commanded by Colonel Marshall Brown, Junr., a teacher of medicine in New York University.

The Surgical Service included : 1 maxillo-facial surgeon, 1 neuro-surgeon, 2 orthopædic surgeons, 1 thoracic surgeon, 3 general surgeons. In addition, two teams had been organized for treating shock.

The commanding officers of these field and evacuation hospitals have demonstrated their ability to set up their formations remarkably quickly. Colonel Brown told me he had set up a hospital with 750 beds and 10 operating tables in ten hours.

Let us now trace the progress of an American wounded soldier who is a stretcher case from the front line to the railhead.

He receives first Aid from " Medics " of his platoon, battery or other unit, and is taken by them to his unit aid post where, after receiving attention from one of his unit medical officers, he is carried by litter, i.e. stretcher, bearers of medical battalion of his Division to the nearest collecting post formed by a collecting company of the medical battalion of his Division. Instead of hand carrying, Jeeps fitted to carry two to four stretchers are largely used. The fitting to carry stretchers on the Jeeps are improvised and are usually a wooden framework.

From the collecting post he is conveyed by ambulance to the clearing station set up by the clearing company of the medical battalion where he receives any surgical treatment necessary at the field hospital platoon attached to the clearing station.

Thence he is evacuated to the evacuation hospital. Cases not requiring immediate surgery cut out the field hospital and go direct from the clearing station to the evacuation hospital.

At the evacuation hospital he receives all necessary surgical attention and then he goes by ambulance to a holding unit at the railhead, but if likely to recover in a few days he is not sent back but passed to the Army convalescent hospital in the Army area.

CONCLUSION.

I was deeply impressed by the Medical Service being provided for the American Armies in the European and Mediterranean Theatres of Operations.

The medical and surgical equipment is of the highest order—even the stretchers, or litters as the Americans call them, are made of the best canvas, provided with light and strong poles and with aluminium feet and traverses.

As in our own Service most of the medical officers are civilian practitioners uprooted from their homes and practices to form part of America's mighty military machine.

They are all volunteers and there is, as yet, no conscription of American doctors.

Their professional enthusiasm is only equalled by their belief in, and their admiration for, the Medical Services of the United States Army.

This paper has been submitted to the theatre chief surgeon whose comments are appended.

Office of Theatre Chief Surgeon, H.Q., Theatre Service Forces, European Theatre (Rear).

The article " The American Army Medical Services in the Field," by Major-General R. J. Blackham, has been read with interest in this office. It is a short, clear, concise picture of the Medical Service of the Army.

One cannot help but be impressed with the conclusions found in this paper. We of the Service have known of our excellent performance but to have it recognized by such an authority as General Blackham is indeed a compliment.

(Signed) C. F. SHOOK,

Colonel M.C. Assistant.

PARACHUTISTS.

BY

Major **HARRY POZNER, M.C.,**

Royal Army Medical Corps.

[*Received April 15, 1946.*]

MODERN war has assumed a new scientific grandeur. Strategy now lies in the realms of advanced mathematics and atomic physics. The military machine has become all-embracing and vastly complex, and the battlefield recognizes no boundaries in the ever-expanding dimensions of the powers of destruction and repercussion. It would seem that man must eventually be overwhelmed and completely annihilated by the technical Juggernaut he has created. And yet momentous developments in the instruments by which total war is waged have mobilized correspondingly fresh reserves of courage, endurance and resource in the individual. The ponderous, intricate machinery of planning, supply and operation is more than ever vulnerable to the disruptive influences of a few highly trained, steadfast, ruthless and determined men.

"Frog-men" and navigators of the midget submarines have carried the war close to the enemy beneath the surface of the waters. Commandos, Long Range Groups, special missions and guerrillas have effectively struck far and wide in enemy-held territory. In the air, the crews of the jet-planes and stratosphere bombers have reached widely out to the limits of physical and mechanical stress in their efforts to enlarge decisively their operational scope, and airborne troops and men of the special parachute forces, groups and syndicates have forged into a formidable fighting weapon all the human elements of the vertical infiltration and assault. Each of these types is a specialist, with distinct and well-defined qualities of physique and temperament peculiar to the role to which he is committed by the necessities of conditioned war. Here, in this short article, we are concerned only with the parachutist, his origins, background, attributes and psychologies.

The emergence of the paratroop as a separate military entity is closely bound up with Irving's design, development and modification of the automatic release statichute. In its present form and reliability the standard modern parachute is a tribute to human craftsmanship and ingenuity. The idea, however, of airborne operations is of no very recent vintage. General Mitchell, a long-unappreciated American visionary of aerial warfare, believed in World War I that the tenuous stoutly-defended Western Front offered to air-transported troops no very serious obstacle. His views were vindicated a quarter of a century later when the allied airborne divisions skipped the Channel and vaulted over the Rhine. But in the long troubled armistice between the wars the paratroop idea was slowly becoming an imposing reality. Russia, with her now not surprising rapid exploitation of new tactics, exercised

the minds of foreign military attaches at Voronezh and Kiev, and demonstrated very ably between 1930 and 1935 that the parachutist was a new and potent factor in ultra-mobile warfare. Germany was also quick to recognize the potentialities of this striking force in international power politics, and, under Sperrling, a corps elite of parachutists was soon in the process of formation at Spandau. Italy unhesitatingly followed suit. France, Czechoslovakia and Republican Spain dabbled ineffectually in the possibilities of this new arm, but it took the unpalatable facts of Holland, Eben-Emael and Crete to arouse the great democracies to the presence of a new spearhead in the attack. In Britain pioneers of the airborne forces were not slow to see the urgency of their task, and men like Rock and Landers were soon working brilliantly and at fever-heat in close co-operation with the R.A.F. to devise new methods of training, suitable weapons and appropriate equipment. Out of the ineptitude of the early days of the war the prototype of the men of Normandy, Arnhem and the Rhine was slowly but distinctly and hearteningly emerging.

The limited supply of man-power for any specialist formation in the British Army has always been a difficult problem, and this was to be intensified in the needs of the newly raised airborne units. Before recruiting men for parachute duties there obviously had to be some criteria for the type of soldier required. Since the knowledge of the duties, training and operational capabilities of the paratroop was still largely a matter of conjecture, the fact of parachuting tended to overshadow the primary requirements of any good infantryman. The lesson that had to be learnt was that a parachute unit was composed of men of strong will and good courage, to whom the parachute jump was merely an incident in a special mission to reach and hold, regardless of the cost, the desired objective.

At the German Academy for Parachutists the picture of this new type of warrior was clearly defined, and shorn of its Wagnerian and Nietzschean trappings, portrays quite definitely the essentials of his psychological and martial requirements.

" You are the chosen ones. You will seek combat and train yourself to endure any manner of tests.

Cultivate true comradeship, for by the aid of your comrades you will conquer or die.

Beware of talking. Be not corruptible . . . chatter may bring you to the grave. Be calm and prudent, strong and resolute.

The most precious thing in the presence of the foe is ammunition.

He who shoots uselessly . . . is a man of straw.

Never surrender.

You can triumph only if your weapons are good . . . first my weapons and then myself.

You must grasp the full purport of any enterprise, so that if your leader be killed you can fulfil it.

Against an open foe fight with chivalry, but to a guerrilla extend no quarter. Keep your eyes wide open. Tune yourself to the utmost pitch."

These were the tenets by which the parachutist had to live and fight, and into this generally accepted pattern of ethics was woven the framework of

the physical fundamentals. On the basis of work correlated by the instructors in the training hangars, R.A.F. parachutists in the skies and practical psychologists in the field the standard paratroop was gradually evolved.

A man in his middle twenties, he averaged about 68 inches in height and 160 pounds in weight. Wiry and agile his body was capable of sustaining hard knocks and extreme privations. Well orientated and with an intelligence above that of the ordinary soldier he could swiftly assimilate the evidence of his senses and act instantly and effectively, exploiting to the full the slightest advantage in the local military situation. Warily aggressive, his mind could clearly admit the probability of mutilation or death and then resolutely put that aside, knowing in the discharge of his mission with pin-point accuracy the utmost fulfilment.

This was an exceptionally high standard to be maintained, and it meant that the heterogeneous mass of would-be parachutist material had to be sifted and resifted in order to train the chosen few. In every main theatre of war doctors worked, lived and jumped at parachute training schools, and in the U.K., N. Africa and India detailed investigations were carried out in order to standardize the methods of selection of Airborne forces personnel.

The response to the initial call for volunteers was surprisingly high but misleading in that it included a high percentage of regimental misfits, neurotics with temperamental instability, and mildly warped and deviated mentalities together with the inevitable sensation and glamour-hunters and escapists. Where units were transferred *en bloc* to large Airborne formations there was the further complicating factor of the unreasoning, unintelligent group who in company of the passive half-hearted volunteers were dragged along unresistingly in the wake of their stronger minded, more enthusiastic comrades. Fortunately, it was realized from the start that the mere apparent desire to jump did not automatically make a good paratrooper.

It was the responsibility of the Selection Boards to weed out with scientific impartiality the available man-power and produce for basic parachute training at very short notice suitable raw material. Not surprisingly the rejection rate was constantly high. Major Sutton quotes a series of interviews from the Middle East, confirming the results obtained from other selection centres.

Total number of British troops interviewed	..	379	
No. rejected after Matrix Test	..	34	(9%)
No. rejected after Physical Examination	..	46	(12%)
No. rejected after Final Interview	..	106	(28%)
Reserves	.. ..	19	(5%)
Accepted	.. ..	174	(46%)

It was generally understood that only about half of the volunteers were likely to make efficient parachute troops. In India the motives from which men volunteered for parachute duties were examined in some detail by the writer, working with two British battalions previously employed successfully in a specialized jungle force.

TOTAL NUMBER OF MEN INTERVIEWED 1,012
REASONS FOR VOLUNTEERING.

	<i>Serial I</i> (No. of men 475) percentage	<i>Serial II</i> (No. of men 537) percentage
(1) Keen to become parachutists	50.8	52.5
(a) Like the idea		
(b) Temperamentally suited		
(c) Think parachute units the best		
(d) Good sport		
(2) Desirous of a change	14.3	27.5
(a) Dislike ordinary infantry		
(b) "Browned off"		
(c) Want to see action		
(3) Want to keep with friends or unit	22.2	13.8
(4) Extra pay	4.8	3.8
(5) Personal motives (revenge or emotion) ..	3.2	1.3
(6) Withdrew applications on consideration ..	4.7	1.1

It must be emphasized that any attempt to deduce conclusions from these results is not entirely satisfactory since the majority of men were vague and inconsequential in their answers. But it is certain that the factors of increased pay and the potential glamour value of paratroop insignia were really more important than is suggested by the final statistics. The results, however, gave a fairly accurate picture of the temper, morale and possibilities of the respective units, and one was able to distinguish immediately the highly emotional and dramatic types, the waverers and the blatant, unreliable "line-shooters."

The problem of training parachutists has always been a difficult one administratively, depending upon :—

- (a) The facilities for basic ground training.
- (b) The availability of suitable aircraft and specialized equipment.
- (c) The number and quality of the instructors.

Probably no other branch of military training demands so much from the instructor, and since the R.A.F. assumed all the commitments of training the standard of instruction has been uniformly high. The qualities desirable in an N.C.O. responsible for a training "stick" are the abilities to teach clearly and well, to inspire self-confidence, to understand the individual pupil psychologies, and to instil the discipline which will ensure an immediate response to jumping orders without question or hesitation. He must remain level-headed in his approach, neither under-estimating nor over-emphasizing the routine hazards of the work ; and it has been most marked that in their respective treatments of an identical problem the serjeant-instructors of the R.A.F. have been remarkably successful.

The small accident rate which represents the normal risks of parachuting is affected by many factors, amongst which the following are most common :—

- (1) *Climate and Location* : Injuries are fewer in India and the Middle East than in the U.K. owing to the lesser prevalence of high winds, the better atmospheric conditions and the presence of softer landing zones.

- (2) *Jumping Procedure* : The door jump from the Dakota is said to cause fewer injuries than aperture jumps or exits from other types of aircraft.
- (3) *Variations in Equipment* : The use of the long stop allows the parachutist to be well clear of the aircraft before the initial development of the canopy, with less danger of this catching on the tail-plane and less chance of injury.
- (4) *Night and Day Jumps* : Night jumps tend to cause more injuries than day jumps since at night it is generally not possible to see the terrain clearly, and students are liable to mistakes in the judgment of height, lose the correct landing position by instinctively reaching for the ground with their feet and invariably make bad and heavy contacts.
- (5) *Variations in the Technique of Landing* : Pulling on the forward lift webs in order to make a forward landing irrespective of the direction of the wind has considerably reduced the number of vertebral injuries, generally due to bad backward landings.
- (6) *The Use of Specialized Paratroop Equipment* : This has resulted in an increase in the number of accidents since parachutists, particularly those small in stature, tend to lose the correct exit position in door jumps with resultant somersaulting and entangling of the rigging lines in the equipment. A delay in the release of the kitbags and valises whilst still in the air also causes heavy, obstructed landings.

In spite of all these factors, the injury rate has been consistently low, and this is illustrated by a series of comparative statistics collected over a period of eighteen months (January, 1944 to June, 1945) from No. 3 P.T.S. where the pupils consisted of mixed European and native troops, and door jumps were made from Dakotas (C.47) flying at a height of 500-1,000 feet and at a speed of 100-120 m.p.h. I.A.S.

TABLE I.—CONSOLIDATED ACCIDENT STATISTICS.

Total No. pupils	Total No. descents	Deaths	Death-rate	No. of injuries	Inj. rate	Injuries incapacitating for 7+ days
11,898	66,408	12	1 : 5534 (0.018% descents)	178	1 : 373 (0.26% descents)	113

TABLE II.—COMPARATIVE ACCIDENT RATE—GROUND TRAINING AND JUMPING.

Total No. accidents	No. of ground accdts.	Percentage	No. of jumping accdts.	Percentage
178	55	30.9	123	69.1

TABLE III.—ANALYSIS OF MORE COMMON INJURIES—LONG INCAPACITY.

No. of pupils	Total No. accidents	Lower limb injuries	Upper limb injuries	Vertebral injuries	Concussion
11,898	178	60	8	20	2

TABLE IV.—INJURY RATE IN QUALIFIED AND UNQUALIFIED PARACHUTISTS
USING SPECIAL EQUIPMENT—NIGHT AND DAY JUMPS.

		Qualified			Unqualified		
		(1)	(2)	(3)	(1)	(2)	(3)
Type of jump		No. of descents	No. of accidents	Inj. rate percentage descents	No. of descents	No. of accidents	Inj. rate percentage descents
(1) Day without Sp. Equip.	..	2,874	Nil	Nil	13,272	22	0.17
(2) Day with Sp. Equip.	..	5,677	18	0.32	779	2	0.27
(3) Night without Sp. Equip.	..	Nil	—	—	1,782	13	0.79

Of those men who were selected for basic training it was found by independent observers that certain psychological groups could be clearly discerned.

(a) The first group, by far the smallest one, and constituting about 5 per cent of the volunteers under training, consisted of men who from the first regarded parachuting purely as a sport and an end in itself. These are the "naturals" who find a stimulation in the high degree of physical and mental co-ordination required, similar to the demands of high-diving, ski-jumping and mountaineering.

(b) The second group, roughly about 15 per cent, contained those who later on in their training acquired the taste for parachuting as a sport. Their confidence grew with their technical progress, and eventually they made keen and efficient performers.

(c) The third group, some 70 per cent, consisted of those volunteers who had no actual liking for parachuting as a sport. They regarded it with a sensible degree of perspective as a necessary part of a job to be done. These men, who form the largest group, have no illusions about themselves and experienced at every jump a mild natural anxiety which, however, is not pathological, is easily controlled, and does not interfere with their military efficiency.

(d) The last group, about 10 per cent, amongst which there were men with a considerable amount of personal courage, consisted of those volunteers who never became mentally reconciled to the prospect of parachuting. To these individuals each jump became a greater ordeal requiring a stronger effort of the will, a sterner suppression of the emotions. It was amongst men of this type that one found the potential and acute anxiety neurotic states and all the evidences of "jump fatigue," which, in view of the inevitable risks involved in operational parachuting is a natural companion to those conditions termed "combat flying fatigue" and "battle exhaustion."

The production and training of parachutists has always been subject to the limitations of the considerable expense necessary to create one trained paratroop, the urgency of tactical requirements and the not over-adequate supply of suitable material. Therefore the problem of "refusals" in man-wastage has always been one of extreme importance. The refusal of a parachutist to jump after he has qualified for his wings and is drawing operational

pay constitutes a serious court-martial offence, whereas a refusal during the unqualified training period results in the student being returned immediately to his unit, a severe penalty for those who are keen but unsuitable. A high incidence of refusals is to be avoided since, apart from the unwelcome "infectious" aspect of such an occurrence, it gravely reflects upon the morale, training and selection of the troops concerned. The methods which have been adopted to reduce the number of refusals have been concerned mainly with :—

(a) The creation of Airborne Forces Selection Boards. These, profiting by long experience in U.K., Middle East and India Command, have been unquestionably successful and justified their existence.

(b) The right approach to instruction which inculcates a correct perspective, the "short term policy" attitude and the necessary automatic response to jumping orders.

Lieut.-Colonel Alex Kennedy, R.A.M.C., has done valuable work in investigating refusals at the M.E., P.T.S. He states that the apprehensions which are natural to potential parachutists are not in most cases due to the fear of death, but to the deep-rooted instincts which prevent all animals dropping from heights and to the aversion of putting oneself in a situation over which there is no complete control. To this, however, must be added the natural qualms that the individual has in having to depend for his safety upon an apparatus which, he suspects in his own mind, cannot be 100 per cent foolproof. The aviator leaping clear of a burning plane is more than willing to take this slight hypothetical risk, but the professional parachutist feels that he is entitled to an absolute measure of security, and is apt to become apprehensive when he observes some occasional failure in the equipment he has taken for granted.

Refusals occur at four stages of training, which is divided into ground training and the actual jumping training involving six to nine descents.

(1) *Ground Training and Air Experience.*—Refusals in this stage were most common before the introduction of Selection Boards, and were due to the fact that the wrong types of men were allowed to go from their units to the P.T.S.s. Some of these men discovered that their volunteering enthusiasm was purely an assumed and transient phase which faded away in the hesitant prospect of the first jump. Others were unable to cope with the specialized apparatus in the training hangars. The swings, fans, slides and giant-strides were liable to cause minor injuries, which were used by malingerers as a basis for delaying or postponing indefinitely the actual jump. Another group, a genuine one, suffered from sickness on air-experience flights and were unsuitable for further training.

As an illustration, the following refusal statistics are taken from a group of students at No. 3 P.T.S. over a period of twelve months (January, 1944, to December, 1944).

<i>No. of pupils</i>	<i>Total refusals</i>	<i>Refusals on air experience</i>	<i>No. airsick</i>	<i>No. refusals to jump</i>
2,893	103	14	12	89
	(3.56%)	(0.48%)	(0.41%)	(3.07%)

(2) *The First Jump*.—The men who refuse at the first jump are generally small in number and consist mainly of volunteers who have no idea until they are confronted with the actual situation that they are going to refuse, but find that when the moment arrives the effort is too much for them. It is a well-known phenomenon that a large percentage of pupils prior to the first jump are afraid not of the act of the parachuting but of the possibility that in spite of themselves they may not be able to make the required physical effort, and they hope desperately that that will not be the case.

(3) *The Second Jump*.—The men who refuse at the second jump are generally those who found the reality of the first jump too much for them, particularly when a strong effort has been made to overcome the preliminary fears. This is more often seen in balloon jumps, where the sensation of free falling is more pronounced than in aircraft jumps owing to the slower development of the canopy.

(4) *Later and Post-Qualification Jumps*.—Men who refuse later on the course consist among others of a small group who have genuinely tried to qualify but have found the emotional conflict an insuperable obstacle. The rest have all manner of excuses for refusing, but in the majority they are malingerers. Some state that they have done enough jumps to prove that they can do it if necessary, but that they do not want to carry on for a variety of reasons, most of which are completely invalid.

One group of refusals at an overseas training school who refused at the fourth and fifth descents stated that they did so as a protest against their training conditions and service. The real reason was a general deterioration in morale of the unit, and a realization that the end of the war was approaching. As qualified paratroops they would have had to remain operational for a whole year, a condition which was made quite clear at the time of volunteering, but which in the changed circumstances—newly published release and demobilization regulations—made such a contract undesirable.

The men who refuse on operations after qualification do so knowing full well that unless there is some perfectly valid medical reason, they are breaking a contract and are liable to severe penalties since they are endangering the success of an operation and the safety of their comrades.

It is interesting to record the more florid psychological manifestations in men who, though they have never refused to jump, still harbour strongly suppressed fears of parachuting. Workers at American training schools have described the typical "belle indifference" of conversion hysterics in paratroops grounded by some minor injury, and in the U.K. and India one has seen frequent examples of compulsions and obsessions. In these states the act of jumping is subjected to a variety of bizarre and arbitrary circumscribing conditions. A case has been noted of a young sergeant-instructor who, already having performed more than a hundred descents, would eventually only jump when it was a bright Sunday morning and the date of the month could be divided by six. The majority of the obsessions are concerned with an unshakable premonition of impending death. This does not interfere with the

man's parachuting activities, but, after he has put all his affairs in order, he carries on firmly convinced that a series of jumps without incidence can only render more certain the inevitable fatal descent. These cases are, of course, all psychoneurotics suffering from the exhaustions of a prolonged psychological conflict, and their salvation lies in a sympathetic analysis without any stigma being cast on their courage or ability.

The thought pattern of all parachutists on their first training jump from an aircraft follows the same general motif. In the aeroplane before the order "Prepare for Action" there are the same mild depressions and introspections. At "Action Stations" after the static lines are hooked up there is the characteristic conscious effort of will followed by a focal concentration of all the faculties on the impending jump. Immediately preceding the order "Go" there is in most cases a complete surrender to an attitude of fatalism which has been summed up in phrases such as, "Whatever happens, I'm going," "At any rate it will be quick," "It's now or never." During the free fall before the full development of the parachute there is the same confused mental phase, which has received the misnomer of the "black-out," a state which disappears in the experienced jumper. After the parachute has opened and the descent has become comparatively slow, gentle and comfortable there is an exhilaration which reaches its peak about an hour after a successful landing, when the mass release of all the apprehensions and emotions has been succeeded by an all-pervading sensation of self-confidence and accomplishment. Unhappily the emotional swing is automatic, and during the second jump the cycle of sensations is repeated but in most cases to a lesser degree. It is on the variation of intensity of these emotional cycles that the future and operational value of the individual parachutist depend.

During the past few years it has been possible to observe in training and in action parachutists of many countries, and the best of the national characteristics are automatically reproduced in the individuals. In the British parachutist there is unfailing tenacity and the ability to cope phlegmatically with a variety of adverse circumstances. The Americans display ebullience and the capacity to rise, if the moment be big enough, fully to the occasion. The Australians and the Canadians are splendidly aggressive, and in the Poles and the Czechs there is a magnificent *élan* and volatility of spirit.

In the Indian Airborne Forces where British, Indian and Gurkha troops trained and fought together the comparison is even more interesting. The Indians in general were much more imaginative and responsive to the demands of a specialized training than the Gurkhas and in consequence were technically the better jumpers, but on the ground the balance was maintained by the superb inherent martial qualities of the Nepalese. The Indians volunteered for reasons of "izzat" and, as in most cases, quite frankly for the considerable increment in pay. The Gurkha had no clear-cut reason for volunteering except an instinctive loyalty to his officers and comrades who did, together with an enthusiasm for any new form of experience.

The following comparative accident figures during training for the period January, 1945 to June, 1945, are interesting to note.

<i>Troops</i>		<i>No. of descents</i>	<i>Total injuries</i>	<i>Injuries percentage descents</i>
British ..	..	18,449	73	0.39
Indians ..	..	13,937	20	0.14
Gurkhas ..	..	3,100	6	0.19

It is seen that the injury rate is greatest for the British and least for the Indians, and it was noticeable that the refusal figures were of the same order.

The probable reasons for the injury statistics may be summarized as follows:

(1) The average British soldier was heavier than the average Indian or Gurkha in the ratio of weights 5:4, and therefore tended to make a heavier landing.

(2) In the training the Indian was apt to make his landing in a much more relaxed bodily condition than the British troop and, though technically his landing was inferior, his chances of being injured were decreased.

(3) The exits of the Gurkhas from the parachute door were poor compared with the British and the Indians. Generally shorter in stature and less rigid than the other troops the tendency with heavy supplementary equipment was to somersault with a greater possibility of injury.

Indian troops included most of the martial races such as Punjabis, Pathans and Mahrattas, but it was found later that Madrassis also made excellent jumpers. For various reasons, mostly of a religious nature, Sikhs were not accepted for training until a late stage of the war, but those that were eventually selected were of a very fine type and passed their courses well. An interesting observation was that some of the best and most reliable parachutists came from the lowest religious castes.

The hill men were uniformly good. Gurkhas, Gharwalis, Luchais and the irregulars, such as the Chins and Kachins, provided extremely satisfactory material for training, being apparently fearless and certainly most dependable in an emergency.

In a world not at war there is generally little scope for the specialized talents of those most prominent in the military virtues. And yet the same basic qualities of courage, determination and initiative are as obviously necessary. The parachutist has, of his own active accord, achieved a certain high measure of mental and physical control, and should therefore be well equipped to meet the demands of the more insidious battles of the peace.

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THE NEPHRON IN NEPHRITIS.¹

BY

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THE classification of nephritis, whether on a histological or clinical basis, leads to complexities which tend to baffle the student. The following attempt to unify the disease by considering it in terms of the function of the individual nephron and its blood supply, explains many of the clinical manifestations. It is realized that this presents a very simplified account of a most intricate disease and that much is based on hypothesis that is difficult of proof, but it has been found helpful as an introduction to the disease.

It is now believed that acute nephritis is not primarily a disease of the kidneys, but that it is a general disease of the capillaries throughout the body. This is suggested by the high protein content and distribution of the œdema, by the occasional occurrence of hypertension and even œdema before the appearance of albuminuria, and by direct observation of capillaries in the nail bed. Nevertheless the brunt of the attack is borne by the renal vascular system.

The main renal lesion in acute nephritis lies in the afferent arteriole and capillaries of the glomerulus, leading first to increased capillary permeability, with the appearance of albumen and red cells in the glomerular fluid, and later to the gradual obliteration of the vessels. The majority of cases of acute nephritis proceed to "clinical cure"—that is to say the œdema disappears, the hypertension and blood urea return to normal and the urine ceases to contain albumen and red cells. There are two possible explanations of this cure, the glomerular capillaries may have recovered, so that the nephrons are again functioning normally, or the damaged units may have ceased to function altogether, so that the apparent cure represents the survival of the healthy nephrons. If the glomerular capillaries become impermeable, blood flow to that glomerulus will cease, no filtration can occur and no contribution from the damaged nephron will appear in the pelvic urine. If the blood supply to the damaged glomerulus is not completely occluded, albumen and red cells will persist in the urine.

The blood supply to the tubules comes mainly through the efferent arteriole from the glomerulus, the plasma, denuded of its solutes by filtration in the glomerulus, reconstituting itself by selective reabsorption from the tubules. A diminished blood supply to parenchymatous tissue often results in its fatty

¹Based on a Paper read to the Burma Services Medical Society, November, 1945.

degeneration. The damaged, but still patent, glomerular circulation must result in a diminished blood supply to the tubules, so that fatty degeneration of the tubular cells might be expected to follow the glomerular lesions of acute nephritis, and such is, of course, often the case.

The second stage of nephritis, parenchymatous, hydræmic or nephrotic nephritis, is characterized histologically by fatty degeneration of the tubular cells. Degeneration of these cells, be it fatty as in nephritis or the rare primary nephrosis, or syphilitic or due to deposition of amyloid, leads to a characteristic syndrome with massive albuminuria, lower blood proteins with œdema and a marked rise in blood cholesterol. The source of the albumen in these conditions is undecided, but the massive loss of protein is a characteristic of tubular degeneration.

Not all cases of acute nephritis proceed to this nephrotic stage; many pass insidiously to the stage of chronic nephritis without ever having excessive albuminuria and low protein œdema. If the blood supply to the nephron is completely occluded, no urine is formed, the tubular blood supply is greatly diminished and rapid tubular degeneration must occur, but, again, the results of this degeneration cannot be reflected in the pelvic urine.

It is suggested, therefore, that the occurrence of the nephrotic stage in a case of acute nephritis is evidence of the continued survival of the damaged nephrons. If this is so, one might expect that eventually the blood supply to these damaged glomeruli would fail, with resultant complete degeneration of the nephron and cessation of albuminuria. This fits clinical experience for some cases of nephrotic nephritis do improve with apparent though usually temporary cure, while in others the nephrotic syndrome subsides as the patient passes on to the third stage of nephritis.

With a large number of nephrons destroyed, the future of the patient depends upon two factors, the function of the surviving units and the effect of the fibrosis that replaces the damaged tissue. The nephrons that have ceased to function can play no further role in the disease, but there is always the risk that a recurrence of acute nephritis may damage more healthy units, with the reappearance of red cells and albumen in the urine and occasionally the dramatic onset of renal failure. This recurrence of acute attacks, occurring at any stage of the disease, complicates not only the clinical but also the histological picture of nephritis.

The fibrosis is slow and insidious and the patient may remain fit with normal renal function for many years. But ultimately this fibrosis leads to ischaemia of the surviving renal tissue with resultant hypertension, and, at the same time, impairs the function of the surviving nephrons. The patient then passes on to the clinical stage of chronic nephritis with hypertension and his normal renal function gives way first to compensated and finally to uncompensated renal failure and death.

When reviewing a case of nephritis, there are certain questions which one should be able to answer:—

(1) How long a history of renal disease is present ?

(2) Is there any evidence of acute glomerular damage as shown by the presence of red cells in the urine ?

(3) Is there any evidence of tubular degeneration as shown by the massive albuminuria, lowered blood proteins and raised cholesterol ?

(4) Is there any evidence of renal ischaemia as shown by persistent hypertension ?

(5) What is the renal function ? Is it normal, is there compensated renal failure as shown by renal function tests, or is there decompensated renal failure and uræmia ?

Armed with answers to these questions, the clinical state can be more surely judged and the prognosis more accurately assessed than is the case when the diagnosis is made in terms of a complex classification.

My thanks are due to Major-General W. E. Tyndall, *C.B.E., M.C.*, Director of Medical Services, Headquarters, Allied Land Forces, S.E.A., for permission to forward this article.

REGIONAL BLOCK ANALGESIA.

BY

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[Received February 1, 1946.]

THIS is a plea for the consideration of the value of regional block analgesia in certain surgical conditions, with brief accounts of three illustrative cases.

Pentothal sodium has been widely used in recent years and has proved eminently satisfactory as an anæsthetic for the majority of war surgery ; it has the advantages of portability, simplicity of administration and safety (in skilled hands). Furthermore, "local analgesia" is of little value where the injuries are multiple, as is commonly found. It is hoped nevertheless to show that on occasions regional analgesia can be an extremely useful method.

The following are claimed as advantages of the regional analgesia technique ;—

- (1) There is minimal disturbance to the metabolism of the patient.
- (2) Irritation and depression of the respiratory tract are reduced.
- (3) The blood-pressure fall is minimal and shock is not increased ; indeed, it is to be expected that some improvement may result owing to the shutting off of pain impulses to the brain. It may be noted here that the method is of especial value in cases of massive muscle damage which do not respond to resuscitative measures.
- (4) Relaxation in abdominal cases is exceptionally good.
- (5) A minimum of apparatus and equipment is required.

(A) CASES INVOLVING THE UPPER LIMB.

Here brachial plexus block is employed. This finds particular use in cases of compound fracture of the humerus, for the conscious patient can sit up for the application of a thoracobrachial plaster.

Technique (fig. 1).—The patient lies on his back with one pillow under the head, which is turned away from the affected side. The arm lies by the side and is pulled towards the feet to depress the point of the shoulder. 2 per cent "Novutox" has been customarily employed, but it is probable that 1 per cent would prove adequate. An intradermal weal is raised 1 cm. above the mid-point of the clavicle, just to the lateral aspect of the arch of the subclavian artery which should be palpated at this stage ; as a further guide it may be added that the site of the weal corresponds usually to the point of disappearance of the external jugular vein.

A fine 8 cm. needle, without a syringe attached, is inserted through the intradermal weal in a direction, medially, caudally and posteriorly, aiming at the approximate position of the third thoracic spine. Contact should be made with the first rib on its upper and lateral surface. Having located the

first rib soundings are taken anteriorly along it with the point of the needle until the needle lies close to the subclavian artery as shown by transmitted pulsatory movement of the needle. It is then known that the anterior limit of the brachial plexus has been reached. Provided a fine needle is used and lateral movements of the needle point are avoided by moving the needle only longitudinally in its own axis, puncture of the artery, while undesirable, is unlikely to be of serious consequence.

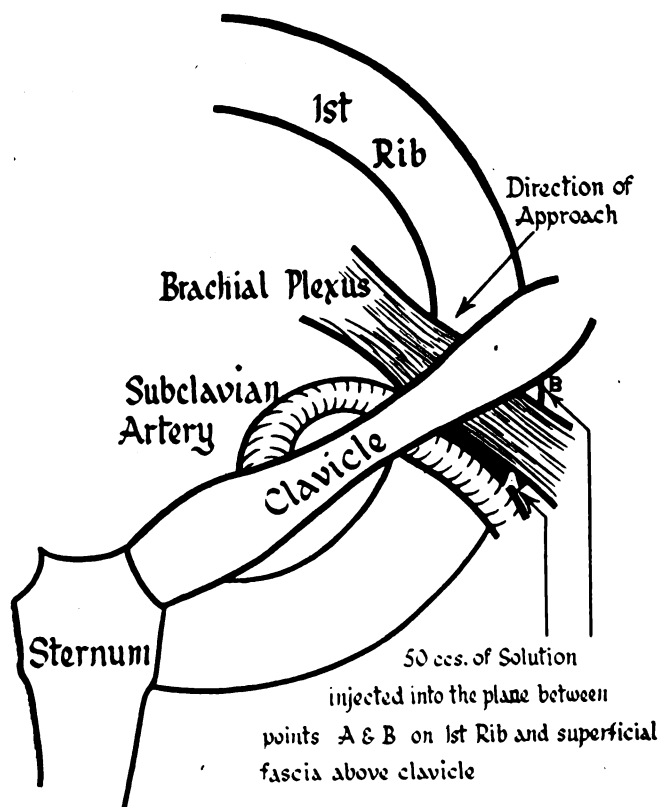


FIG. 1.

If at any time during the sounding process paræsthesiæ are felt in the hand, it may be presumed that the point of the needle lies within the plexus of nerves and, without moving the needle and after aspiration to make sure that the needle does not lie in a vessel, 15 c.c. of local anæsthetic are injected.

In any event, having located the anterior limit of the plexus as above described, local anæsthetic is injected (after the aspiration test) between the rib and the superficial fascia as the needle is withdrawn.

Further insertions of the needle and injections are made more posteriorly along the rib until a length of about 4 cm. of rib has been covered, in 4 or 5 stages. A total dose of 50 c.c. of anæsthetic solution is adequate.

CASE I.—A soldier was riding in a truck with his left arm hanging over the side, an oncoming vehicle struck his arm causing a severe smash injury of the forearm with gross disorganization of the elbow-joint. Shock was severe on admission one hour later and transfusion of 1 pint of plasma and 2 pints of blood was made, with some improvement after one hour and a half. Morphia $\frac{1}{4}$ grain had been given intravenously soon after injury. Omnopon $\frac{1}{3}$ grain and scopolamine $\frac{1}{150}$ grain were given intravenously as premedication; a brachial plexus block was carried out as above described and amputation was performed at the junction of the middle and lower thirds of the arm.

At the end of the operation the patient was asleep and his blood-pressure was then 120/80. He made an uninterrupted recovery.

(B) CASES INVOLVING THE LOWER LIMB.

Here the technique used is that of massive muscular infiltration ; 200 c.c. of 0.5 per cent procaine are required.

Technique (fig. 2).—In the upper third of the thigh a solid transverse disc including all tissues of the thigh—skin, subcutaneous tissue and muscle down to the bone—is infiltrated. The initial skin weal is made on the anterior aspect of the thigh and, using a fine 12 cm. needle the subsequent injections are made

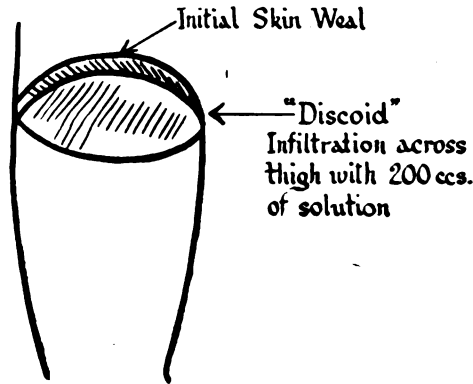


FIG. 2.

fanwise into the deeper tissues, until the whole cross section has been “soaked” uniformly. Care is especially necessary on the medial side of the thigh, in the region of the femoral vessels.

CASE II.—An Italian Civilian, aged 42, of very poor physique, being only five feet in height and having a very severe kyphosis due to an old tuberculous disease of the spine, was knocked off his motor cycle by a heavy lorry. His left leg was grossly mangled, the muscles of the calf were exposed and very severely damaged. There were compound, comminuted fractures of both bones of the knee-joint which was totally disorganized.

Resuscitation with plasma and blood transfusion was carried out for two hours, without response. The pulse was barely palpable and the blood-pressure was unreadable. The patient was obviously moribund and a desperate attempt to save his life by amputation under local analgesia was decided upon.

Premedication of omnopon $\frac{1}{3}$ grain with scopolamine $\frac{1}{150}$ grain was given intravenously. A block analgesia was performed as above described and amputation was carried out through the thigh. At the end of the operation the quality of the pulse was much improved, his blood-pressure being 105/50.

The next day his condition was very good indeed and his survival seemed likely; unfortunately his condition later deteriorated and he died five days later with signs of paralytic ileus.

(C) CASES INVOLVING THE ABDOMEN.

It was felt that in these cases "sleep" plus a regional block would provide the most satisfactory technique.

The "sleep" is produced by minimal pentothal anaesthesia; in addition oxygen or nitrous oxide with plentiful oxygen may be given by inhalation. 0.5 per cent procaine is used for the infiltrations.

Technique (fig. 3).—(a) The patient lies in the dorsal position with his arms raised above his head. Induction of anaesthesia is made with a minimal dose

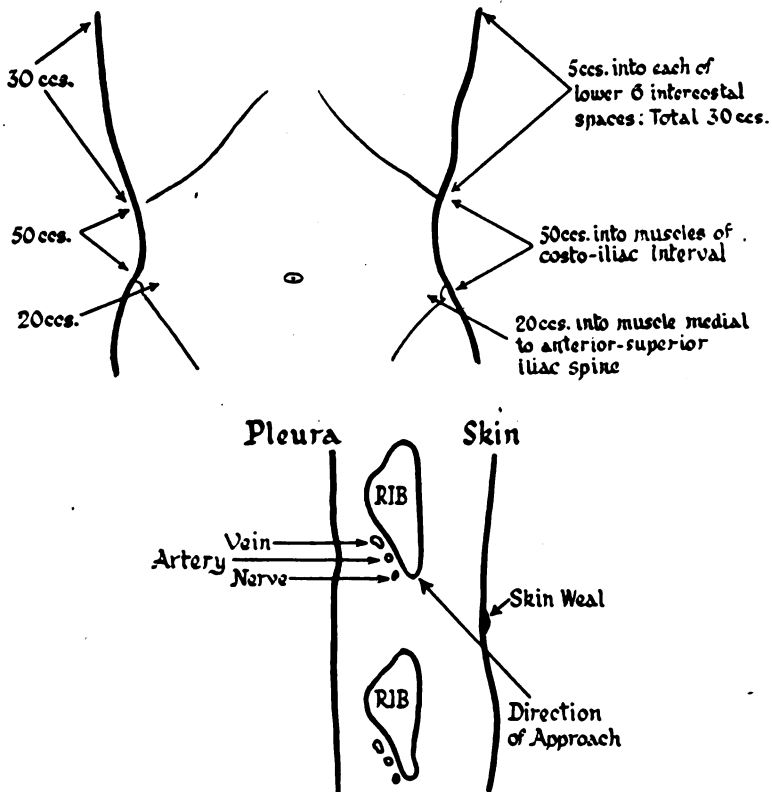


FIG. 3.

of pentothal. The smallest possible doses are subsequently given to keep the patient asleep.

(b) The lower six intercostal nerves on each side are blocked in the mid-axillary line with 0.5 per cent procaine.

It is undesirable and often impossible to turn many battle casualties over and perform the intercostal block posteriorly. To block each intercostal nerve, weals are raised over the intercostal spaces in the mid-axillary line, using a fine hypodermic needle.

Using a 5 cm. needle with syringe attached, soundings are then taken across the lower border of each rib. Keeping the needle point moving across

the rib, 5 c.c. of solution are injected into the region of each intercostal nerve as it lies against the inferior aspect of the rib.

(c) 50 c.c. of solution are infiltrated into the muscles of the costo-iliac interval on each side. 20 c.c. are injected into the muscle internal to the anterior superior iliac spine on each side.

(d) Posterior splanchnic block by the Kappis method, though valuable in cold surgical cases, is not possible where there is difficulty in turning the patient over to get at his back.

Anterior splanchnic block (Braun) may be carried out by the surgeon after the abdomen is opened, 50 c.c. of solution being injected down on to the anterior aspect of the first lumbar vertebra. Where the patient is kept "asleep" however, as here described, blocking of the splanchnic nerves does not appear to be essential.

CASE III.—An officer wounded in the abdomen eight hours previously by an aerial bomb fragment reached the C.C.S. after a long journey. His condition was fair prior to operation: B.P. 110/60, pulse 110. He had had 2 pints of blood and 1 pint of plasma transfused, a second pint of plasma was running at the beginning of the operation. Premedication by omnopon $\frac{1}{2}$ grain and scopolamine $\frac{1}{800}$ grain injected into the intravenous drip. 6 c.c. of 5 per cent pentothal sodium into the drip sufficed for the induction of anaesthesia. Oxygen from a Boyle's machine was administered by inhalation. A total of 17 c.c. of 5 per cent pentothal sodium was used throughout the operation.

A regional analgesia was then carried out as described above: no splanchnic block was performed. A long right paramedian incision was made, 8 holes in the small intestine were sutured, and a metallic fragment was removed. The surgeon commented on the superb relaxation, which he said resembled that obtained by a spinal anaesthetic.

The blood-pressure at the end of the operation was 115/70, the pulse-rate was 96.

Post-operatively intravenous saline was given continuously, gastric suction (Wangensteen) was instituted and an intramuscular penicillin drip was set up. The patient made an uninterrupted recovery.

CONCLUSION.

Whilst no originality is claimed for the techniques employed, the purpose of this paper is to draw attention to the value of regional block analgesia, a method which has proved useful on numerous occasions: three cases are quoted as examples.

Editorial.

JENNER'S WORK AND THE PRESENT POSITION OF VACCINATION.

JENNER, in the course of his "Inquiry into the causes and Effects of the Variolæ Vaccinæ," wrote, in 1799, the following sentence: "What renders the cow pox virus so extremely singular in that the person who has thus been affected is for ever after secure from infection of the small pox." "For ever after!" Should we, to-day, accept this statement as correct? Alas! no. We have learnt to regard vaccination as "the most certain safe-guard" only . . . "*provided it is properly done*" (Army Medical Department Bulletin, Supplement No. 9, November, 1943).

Jenner was here speaking of the cowpox as contracted by persons handling the udders of infected cows. Of the lymph from cowpox and its deliberate transmission to man he wrote: "*When duly and efficiently performed it will protect the constitution from subsequent attacks of small pox as much as that disease itself will.*" He evidently thought that recovery from this disease was enough to prevent any further attack developing at any time. We now know, however, that, in the words of Hart ("System of Medicine," Clifford Allbutt, 1899, Vol. 2, 676), "even an attack of natural small pox does not invariably confer immunity from the disease."

Smallpox immunity is, like every other type of immunity so far produced by vaccination in man, not an absolute but a relative gain. But how very nearly it approaches to the absolute! Of all the procedures for procuring "immunity" it is the most spectacularly successful. This country, which had been one of the most severely infected with smallpox, where nobody was secure from it and where *inoculation from mild cases of the disease itself*, with all its dangers, was still thought preferable by many to the risk of accidental infection, had been rendered practically clear of it thanks to the almost universal employment of infant vaccination and subsequent re-vaccination with Jennerian calf-lymph.

Of late, the number of "conscientious objectors" to vaccination has increased. A considerable minority has had the benefit of sheltering behind the vaccinated majority and has, all unconsciously, been relieved of the necessity of vaccination because such a large number of vaccinated persons has been rendered relatively immune and, therefore, practically incapable of spreading the disease. This advantageous position is lost, to a great extent, when people leave this island for some place where vaccination is less common than at home. "A disturbing observation," says the contributor to the Army Medical Bulletin above quoted, "is that when, in the presence of outbreaks,

men have been *re-vaccinated abroad*, a significant number among those who had been regarded as insusceptible at home have in fact shown normal 'takes.' It is clear that both the number un-vaccinated in infancy is increasing and that, of those vaccinated before embarkation or immediately after, a certain number is recorded as "protected" although the actual degree of protection is equivocal. "It is evident," to quote the Army Medical Department Bulletin once more, "that a batch of potent lymph, carefully tested before issue, may give a proportion of successful vaccinations which varies according to the experience and technique of the Medical Officers who use it." This "experience and technique" shows that, to obtain the best results, the following points must be borne in mind :—

(1) The lymph must be of maximum potency. This is maintained for periods up to fourteen days after issue if the lymph is stored at a temperature of between 0° C. and 10° C., though use within seven days is preferable. At temperatures below freezing point potency is maintained for three months.

(2) The skin of the arm should be washed with soap and water. If ether or spirit is used after the washing, great care must be exercised to ensure that complete drying has taken place before the lymph is applied.

(3) The lymph is blown out of the capillary tube by placing the latter in a rubber "expeller" (Baird & Tatlock, Ltd.) or a simple improvisation with the teat of a baby's feeding bottle (*Brit. Med. Jour.*, 1937, May 22, p. 1066). The capillary tube is cleaned with alcohol and allowed to dry, both extremities cut off by means of a flamed scissors and the open base of the teat closed to expel the lymph by the thumb of the operator.

(4) The scarification is carried out either through lymph expelled from the capillary tube or with a needle freshly dipped in lymph. One-quarter of an inch long is sufficient, but if no vesication is present when the arm is inspected seven days later re-vaccination should be carried out with three insertions of similar length one inch apart. "The ideal result is accompanied by a slight exudation of serum with little or no blood."

Soldiers are human and may try to abort the vaccination by licking off or otherwise removing the lymph. Care in watching the men after this operation and, above all, a careful and antiseptic technique and good treatment will go far to check activities of this kind.

It was Jenner himself whose initiative started the Government Lymph Establishment many years after his discovery of the vaccine, "a discovery," he says, "which reason fully authorizes me to suppose will prove to be peculiarly beneficial to the preservation of the lives of mankind."

It is fully time that the medical profession should combine to inculcate the importance of it among those sections of mankind who are otherwise likely to avoid vaccination.

Correspondence.

THE ROYAL ARMY MEDICAL CORPS COMFORTS GUILD.

TO THE EDITOR OF THE "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS."

SIR,—Now that the war is over the Comforts Guild has ceased to make demands on the numerous groups of workers whose efforts have enabled us to keep up a constant supply of comforts to the personnel of the Corps overseas.

To all those who helped to collect subscriptions, who organized entertainments for the benefit of the Guild, who subscribed so generously to our funds, and to that devoted band of knitters who kept us so well supplied with woollies, we tender our grateful thanks.

It has been decided that while the Guild will not require subscriptions, it should continue to supply comforts to R.A.M.C. personnel overseas. To do this the Committee will work in close liaison with the R.A.M.C. Association and, with the funds at our disposal, will endeavour to meet demands for comforts until such time as welfare of the troops is on a peacetime basis, and will consequently still require a regular flow of woollies from its knitters.

D.Ds.M.S. overseas are being notified of this arrangement and asked to send their demands direct to me at R.A.M.C. Headquarters Mess, Millbank, London, S.W.1.

Yours faithfully,

London.

DULCIA HOOD,

March 7, 1946.

Chairman, R.A.M.C. Comforts Guild.

TO THE EDITOR OF THE "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS."

SIR,—I was very interested in the portion of the report by Major-General T. O. Thompson in the Journal, December, 1945, p. 289, as I was S.M.O. of the camp in Palembang mentioned on p. 290.

The cage in the Palembang camp had not a lean-to roof as there were no walls except barbed wire and nothing for it to lean against. There was, however, a leaf attap roof. Nobody went temporarily insane as a result of incarceration in the cage. I had long talks with some of the men who had been in it for long periods. The few people who did go insane did so for no particular reason except the general conditions of captivity.

Among the improvisations I could mention a saw made from a piece of hoop iron with which I amputated a foot in the early days, and two business ends for a stethoscope, one made from a tap and a bit of switchboard base and the other from the top of an ink bottle with a diaphragm from the lid of an ointment pot. They functioned excellently. One man with a fractured spine had a catheter retained, with very infrequent removal owing to difficulty of replacement, for a year and survived with very little cystitis. Condoms made good finger stalls for rectal examinations. They came in in dozens when the demand was known.

The men brought extraordinary things into camp in their fundoshis (Japanese loin cloths). They are said to have included two durians (a spiky fruit twice the size of a grape fruit) and certainly included a live chicken.

Reinforcements for inadequate plaster of Paris were made from steel rickshaw spokes bent and moulded to the patient's ankle while he was under an anæsthetic. I should like to pay tribute to the untiring work of W/O Joyes, R.A.O.C., who with other instrument-makers was responsible for many of these improvisations. You could get a new mouthpiece for a pipe in camp in twenty-four hours—instead of three months!

Many odd things were eaten, including cats, dogs, rats, lizards, snakes, banana skins, coffee grounds and even maggots from the trench latrines—the latter not in my camps!

A high standard of art was often shown, paintings—drawings, models, carvings—beautiful pipes were carved from guava wood (*Psidium guaiava*)—etchings on aluminium, etc.

Many plants were used as medicine, *Euphorbia hirta* for cough, *Bruses* sp. and *Psidium guaiava* for dysentery, *Desmodium*, *Blumea balsamifera*, *Curcuma* and other Zingiberaceæ, *Alstonia*, etc., although, in my experience, none of them were of great value.

Yeast was made in many camps including ours. Many expert chemists and botanists were concerned in this and some of the Dutch who had their homes in the East Indies helped with their knowledge of the fermentation processes used locally, many of which are wrapped in a certain amount of mystery. I can find few references to these in any reports or literature and the subject is not without importance in view of the present state of nutrition in the Far East. If any reader could refer me to any reports or literature dealing with this subject I should be most grateful.

We also had radio. Sometimes news was brought in by men working on repairs to Japanese sets. The set would be apparently scattered about a bench in pieces but actually wired up for reception. Once it was wired to the telephone receiver of a Japanese officer whose telephone our man was repairing.

Neville Rise Cottage,

Rodmell Road,

Tunbridge Wells, Kent.

February 27, 1946.

Yours faithfully,

J. G. REED,

Surgeon Lieutenant, Malatay R.N.V.R.

Reviews.

RHEUMATISM. Published Quarterly on behalf of the Charterhouse Rheumatism Clinic by the Rolls House Publishing Co., Ltd., 2, Breams Buildings, London, E.C.4. Annual subscription, 10s.

"Rheumatism," which was suspended from 1940, due to war conditions, has now been revived. The journal deals with the clinical aspect and treatment of all rheumatic disorders and is on sale by subscription to the medical profession only.

A COMPLETE OUTLINE OF FRACTURES, INCLUDING FRACTURES OF THE SKULL.
Second Edition. By J. G. Bonnin, M.B., B.S. Melbourne, F.R.C.S. Eng.
London : William Heinemann, Medical Books, Ltd. 1946. Pp. xiv + 658. Price 30s. net.

This book, now brought up to date in its second edition, may be said to present clearly, and with correct emphasis, the views and practice of orthopædic surgeons on the treatment of fractures at the present time.

The first chapters deal with general principles and applications, and provide a lucid and comprehensive account of the problems involved. There is an excellent section on the use of chemotherapy, including penicillin in wounds and compound fractures. In dealing with compound injuries themselves, however, although the author emphasizes the importance of adequate incision and relief of tension, and the necessity of support and immobilization in the early stages, he gives the impression that the closed plaster method is still the method of choice for the majority of cases. Not enough emphasis is placed on the vital importance of skin closure, either by primary suture, delayed suture, or by graft, though these methods are referred to in the section on war injuries. One would hope that with adequate toilet of the wound and penicillin, it would rarely be necessary to leave the wound open, especially under peacetime conditions. A ward full of healthy patients with stinking plasters is surely a thing of the past.

The chapter on war surgery, though brief, embodies most of the lessons learned during the past six years in the treatment of gunshot wounds of the extremities, both at the forward areas and during evacuation. The standard transportation plasters—Tobruk, Thoraco-brachial, etc.—are very well described.

It is good to see the place of internal fixation in the treatment of fractures of the long bones at last given its due prominence. Mr. Bonnin has a chapter on the general indications and the operative technique and, throughout the book, internal fixation, either by single screws or by plates, is recommended whenever reduction is difficult or impossible. This method is rightly given preference over distraction and fixation by pins incorporated in plaster, always provided that there are facilities for strictly aseptic surgery and a knowledge of the surgical technique required. After secure internal fixation, the author does not favour unnecessary immobilization in plaster, but prefers active movements of the neighbouring joints. Indeed, throughout the book the extreme importance of maintaining joint movements, particularly of the fingers, shoulder and ankle, is very well stressed.

The main part of the book consists of descriptions of the diagnosis, treatment and complications of the fractures of different bones of the body, and it would be difficult to find fault with the author's presentation. By omitting all obsolete or rarely used methods, the author has gained in clarity and brevity, and the surgeon or student seeking practical information will find it in a definite but not too dogmatic form. Where two methods give equally good results,

both are given in full, as, for example, in the treatment of fracture of the femur by fixed extension or by skeletal traction.

One might, perhaps, question the author's optimistic account of fractures of the carpal scaphoid. It is the reviewer's experience that a far greater proportion than he quotes have some displacement which leads to delayed union or non-union, and so many of them reach the surgeon when manipulative reduction is no longer possible. While immobilization may cause some of these to unite, the prognosis as to union would seem to be definitely poor. One agrees, however, with his cautious attitude to grafting or excision. The chapter on the ankle-joint, criticized in the first edition, remains unnecessarily elaborate, though the author's views on the mechanism of these injuries deserve close study.

Associated injuries are only dealt with briefly as complications, but one would query the desirability of primary nerve suture in peripheral nerve injuries, even in a clean wound. Experience has shown that these are best left in a muscle bed for suture, after a short interval, through a formal exposure.

In addition to the ordinary fractures of the main bones, there is a very good chapter dealing with head injuries and fractures of the skull and one on jaw injuries.

The book is very well printed, on good paper, and the diagrams and illustrations, especially the X-ray reproductions, are first class, and it is in one reasonably sized volume. It can be strongly recommended for the student and the surgeon, particularly the Army surgeon, who may find himself faced with major bone and joint injuries in a place where skilled assistance may not be easily available.

THE PROBLEMS OF FAMILY LIFE. AN ENVIRONMENTAL STUDY. By Agatha H. Bowley, Ph.D. Edinburgh : E. & S. Livingstone, Ltd. 1946. Pp. vii + 98. Price 5s. net.

This clearly written and thoughtful little book is really summed up in its subtitle, *An Environmental Study*, its chief object being to prove that unhappy, unsettled or even unusual home conditions are responsible for an hitherto unsuspected number of obscure ailments, neuroses, and delinquency in children and adolescents. Typical cases and some statistics are given in support of this theory and to the lay mind should certainly carry conviction.

The first chapters are devoted to the writer's idea of what is required to constitute a normal happy home life, and much stress is laid on the deliberately cultivated assurance of affection and security in the home if the children are to be well and happy.

While not covering any particularly new ground this book which includes some charming photographs is suitable for inclusion among the literature supplied in some Welfare and Mothercraft Centres.

Some chapter headings in verse strike a rather irrelevant note. C. E. E.

Notices.

AN ART SOCIETY FOR OFFICERS.

THE Army Officers Art Society was founded in 1925 for the purpose of bringing together Officers interested in Art, and of providing them with facilities for the exhibition and disposal of their works. It has held fifteen Exhibitions since then, but had to close down during the war.

The Society intends to reopen with its Sixteenth Exhibition early in 1947.

In addition to Officers of the Army and of the Royal Marines, the Society welcomes as Exhibitors Officers of the Royal Navy, the Royal Air Force and of the several Auxiliary Forces connected with these Services.

Any Officer interested is invited to communicate with the Honorary Secretary, Colonel L. N. Malan, 10, Blenheim Road, London, N.W.8, who will send all particulars.

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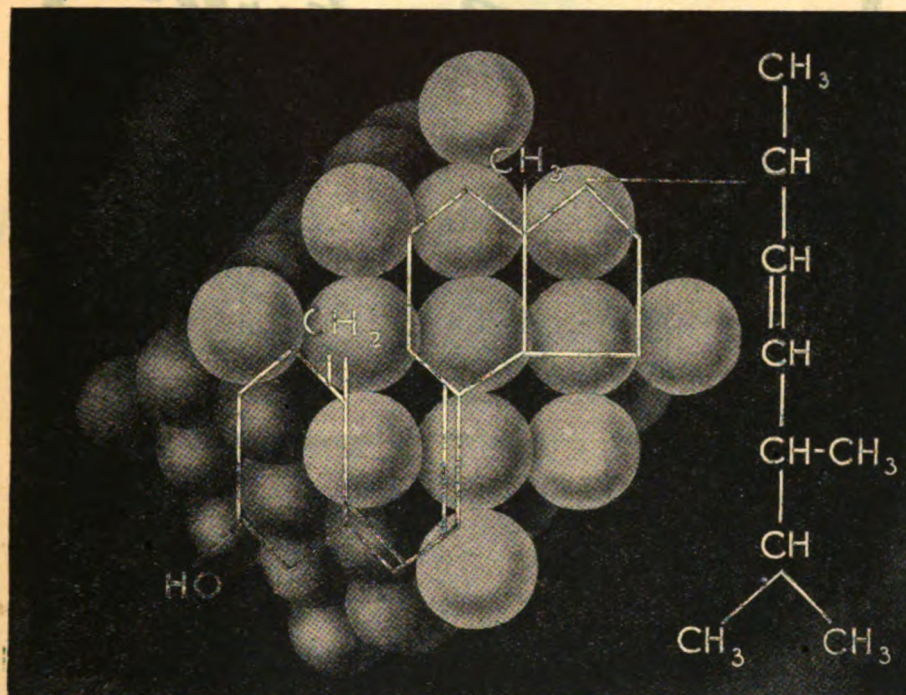


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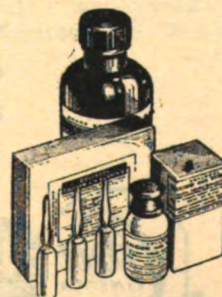
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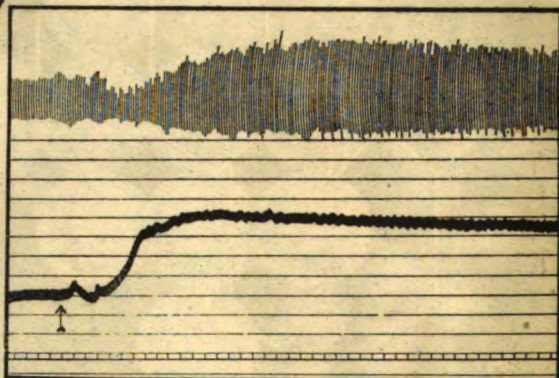
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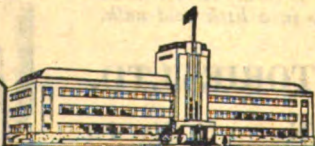
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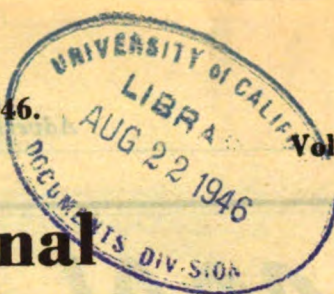
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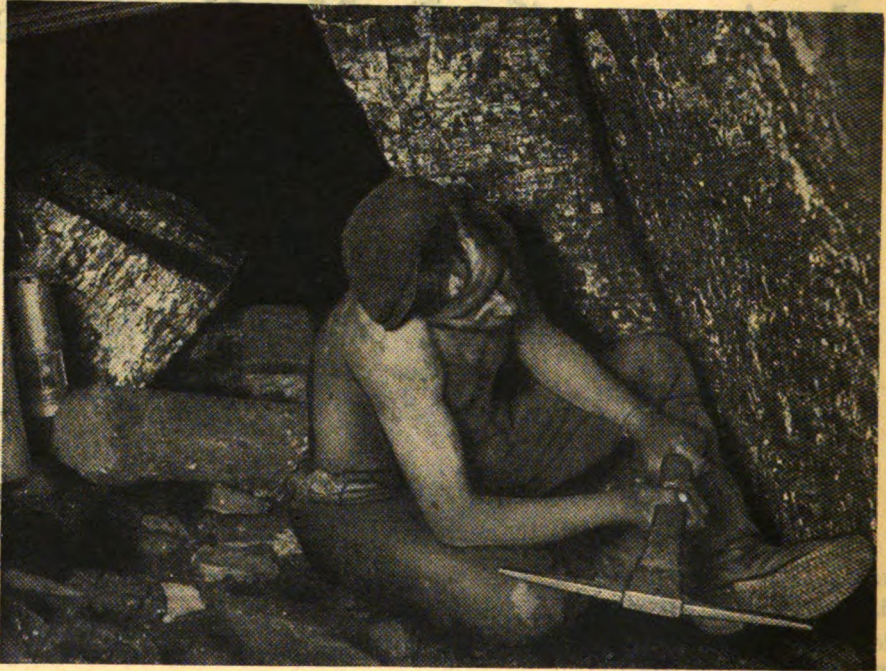
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Original Communications.

"GUEST NIGHT."

ON Wednesday, April 24, 1946, there was a Guest Night in the Headquarter Mess in honour of Colonel F. S. Irvine, *D.S.O.*, *C.M.G.*, the retiring Commandant of the Royal Army Medical College.

The two Mess tables—rather shorter than in the old days—were filled. We were glad to see two old friends, Major-General R. J. Blackham and Colonel George Petit. The String Band of the Corps discoursed suitable music. While the pictures in the Messroom had not returned from their basement shelter most of the Mess silver was on the tables. A sufficiency of well-preserved white tablecloths had been found for the occasion. The Mess staff are to be congratulated on the excellent meal they provided in the present very difficult food situation.

The Director-General, Sir Alexander Hood, was in the Central Chair and proposed the Toast of Colonel Irvine.

From the date of Colonel Irvine's first Commission in November, 1899, the D.G. reviewed his long and valuable service to the Corps and to the Army.

Colonel Irvine went to South Africa in December, 1899. He was present at the relief of Ladysmith. After a trip to England to recover from enteric fever he returned to South Africa and, when the war ended, was S.M.O. to a Column. Then followed a tour in India after which he later returned to South Africa as Adjutant of the Transvaal Volunteer Medical Staff Corps for three years. Returning home he was, first, Adjutant of the Depot and, later, Assistant Commandant of the College.

In the 1914-1918 War he was captured on August 27, 1914, escaped on September 13 and returned to his appointment on September 25—a unique record that still stands. He was awarded the *D.S.O.* in 1915 and the *C.M.G.* in 1916, being twice mentioned in Despatches.

After a spell as Officer Commanding the Depot and Training Establishment he did a tour of duty in India at Rawalpindi and Army Headquarters, Simla. He returned to be D.D.M.S., Northern Command, and retired to a life of peace and quiet in December, 1930.

The Director-General then stressed the valuable service Colonel Irvine had rendered since his voluntary return in the rank of Major to be Assistant Commandant and, in May, 1940, to be Commandant of the College. During his tenure of office his work has been of the very greatest value to the Corps. Through all the Blitz periods he was on duty directing the studies and providing for the comfort and encouragement of the large number of officers who had attended courses at the College or who had visited, or come to stay, in the Headquarter Mess.

The Director-General concluded by conveying the thanks of the Army Medical Services to "Frankie" Irvine and wishing him all happiness in the future.

Replying, Colonel Irvine said :—

"General Hood and brother officers, I am no speech-maker but, as I feel deeply touched by the all too kind things the Director-General has just said about me and by the cordial way you have responded to his Toast, I should like to take this opportunity of thanking you. It would take a long speech if I were to attempt to review the incidents of my period of service as Commandant but I would like to claim your indulgence for a few remarks.

"During my time here I have had the honour and privilege of seeing the leading lights of our profession, both civil and military, not only from our own country, but also those of the Dominions, Colonies, the U.S.A. and other allies.

"My duties as Commandant have been made easy by the devoted service of Officers and Other Ranks and civilians connected with the College who have served me so faithfully.

"In spite of many difficulties and many changes in the staff, the teaching of Hygiene and Tropical Medicine continued throughout the War. When I came to the College in 1940 as Assistant Commandant under Major-General Brooke Purdon, whom I succeeded as Commandant, Lieutenant-Colonel Richmond was Assistant Professor of Hygiene. When he left for the Near East Lieutenant-Colonel Parkinson succeeded him and after him came Lieutenant-Colonel Ryles. Then Colonel Kennedy was appointed Professor of Hygiene and when he went overseas he was followed by Colonel Ryles who is now temporarily away on account of illness and Colonel Stott took his place at a moment's notice.

"Through all the war years Major Stanley Elliott, our analytical chemist, carried on his most important duties—a real pillar of strength to the College and a good adviser to me at all times.

"The Tropical Medicine Department was in the able hands of Lieutenant-Colonel Sidney Smith and, when he left for the Near East, Lieutenant-Colonel Menzies carried on the good work. After him came Lieutenant-Colonel R. M. Drew who, happily, is still with us. Associated with him there have been three Demonstrators in Pathology: first Major Howie, then Major Young, and now Major Geal. The work of the Tropical Medicine Department throughout has been of a very high standard and has gained a well merited high reputation. It may be of interest to recall that nearly three thousand

officers have received a course of instruction in Tropical Medicine and Hygiene since 1940.

"One other aspect of the College activities I should like to mention, namely, research work in connexion with Tropical Medicine. Under Major James Reid, assisted by Flight Lieutenant Joeke, R.A.F., the Army Malaria Chemotherapeutic Unit has done much valuable fundamental work. Important research on Sprue has been undertaken by Lieutenant-Colonel Drew, Lieutenant-Colonel Samuel and Major Kendall Dixon. Their results will soon be published.

"There are but few still serving on the College Staff who have been with us throughout the War Period. Major Elliott I have already mentioned. In addition to him there is my chief clerk, Mr. Barnes, and Mr. Leech, senior laboratory technician, Pathological Department—both have done excellent work throughout a difficult period. Mr. Barnes has been of especial assistance to me personally. One pillar of the College and Mess has been of the greatest help—how helpful only those of the College and Mess Staff will appreciate—I refer to Mr. Cooper the R.E. Foreman of Works. Then there are the boilermen who stuck to their job—Blitz or no Blitz—as did some of our charladies.

"In regard to the Officers' Mess, I would like to mention how fortunate we have been in having some of the permanent members of the Mess Staff carrying on continuously since the outbreak of war. There is Mr. Smith who, until recently, fulfilled so ably the combined duties of Mess accountant and Mess caterer. There is our old friend, Williams, who has taken such good care of us; he cycled to and from his home in the City undeterred by any Blitz. Another grand old friend of us all, and particularly helpful to me—Pomfret, whom I remember when he was looking after the Junior Classes at St. Ermin's Hotel in the days before the Mess and College were opened. Then there are Beesley and Ford, so reliable in all circumstances—George Towner, too, our capable storeman, rarely seen yet seldom leaving the building.

"There have been some notable changes during my tenure of office. One, the replacement of men servants by a detachment of A.T.S., under Serjeant Bland. Serjeant Bland was the first to come and, happily, she is still with us. She and her auxiliaries deserve our thanks for the creditable manner in which they have carried out their duties.

"Another notable change has been the admission of lady commissioned officers to be resident members of the Mess. I have sometimes wondered what would be the feelings of those old gentlemen whose portraits normally hang on these walls had they too witnessed what I once saw in the Mess Smoking Room—a lady Medical Officer in Service Dress—a Major by rank—sitting knitting, smoking a cigarette and reading a magazine and handy to her elbow a tankard of beer!! Judging by what I have seen, it would seem that the presence of lady Members is not unwelcome.

"Finally, I wish to express my great indebtedness to the War Office for all the help they have been to me. Both Administrators and Consultants have been very good friends indeed.

"General Hood and Brother Officers, I feel very greatly honoured by being your guest to-night and I give you heartfelt thanks and wish you all the best of fortune in the future."

SOME PRACTICAL NOTES FOR FIELD AMBULANCE COMMANDERS ON THE MEDICAL CONSIDERATIONS IN PLANNING, MOUNTING AND CARRYING OUT COMBINED OPERATIONS IN SOUTH-EAST ASIA COMMAND.

BY

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[Received January 23, 1946.]

- I.—Introduction.
- II.—Planning. (1) General Plan.
(2) Brigade Plan.
(3) Unit Plan.
- III.—Mounting. (1) Personnel.
(2) M.T.
(3) Equipment Man Pack.
- IV.—Shipping : Life on Board Ship. (1) Boredom :
(a) Organized Training.
(b) Amenities.
(2) Physical Fitness.
(3) Welfare.
(4) Mepacrine Discipline.
- V.—Assault.
- VI.—Follow up.
- VII.—Notes on Personnel Equipment.
- VIII.—Hygiene.
- IX.—Casualty Evacuation Craft.
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I.—INTRODUCTION.

These notes are based on experience gained in operating an Indian Field Ambulance in the early part of 1945 in the seaborne operations along the Arakan Coast. They are only intended to bring out points which have not been emphasized sufficiently in general training and which have proved of importance. They are not supposed to displace any instructions published in any pamphlets on the subject.

II.—PLANNING.

(1) *General Plan.*—Wherever possible the Field Ambulance Commander should be put in the picture as soon as possible in order that he may have time to consider the medical cover necessary for his sphere of the intended operations. It is often all too apparent that the Field Ambulance Commander is consulted too late or has too much of the plan made for him. As a result he may have to redistribute personnel in Company Light Sections in a hurry at a late date.

(2) *Brigade Plan.*—The Field Ambulance Commander must be considered as an integral part of the Brigade Planning Staff in order that he can advise the Brigade Commander of the general plan for medical cover as laid down

by the A.D.M.S. and can advise Battalion Commanders on the best use of their R.M.O. and Medical Detachments.

As soon as is permitted the 2 i/c, Q.M. and Company Commanders should be admitted to the Y.O. List allowing them knowledge of the administrative side and some information of what is required of them.

It is also felt that permission should be asked for those officers who are working with detached sections of the Field Ambulance also to be put on the Y.O. List.

(3) *Unit Plan*.—As soon as possible after initial planning is complete the Field Ambulance Commander should readjust and reorganize his Unit where necessary to adapt themselves to the roll they may be expected to carry out. This should particularly be directed to :—

(a) Correct distribution of personnel (all unfit personnel should have already been disposed of), i.e. organization of Company Light Sections.

(b) Correct distribution of company equipment either M.T. or man pack basis or both : all surplus stores being withdrawn to store.

(c) Correct packing of ordnance and medical equipment in M.T. Making up of a detailed load table, vehicle by vehicle.

(d) Organization for dealing with kit not required for the operation (either return to ordnance or forming a rear dump).

III.—MOUNTING.

(1) *Personnel*.—All personnel must have their kit checked to the scale allowed both before leaving and on leaving unit area and in concentration area. All officers and men must be rigorously restricted to the scale allowed.

Space must be left in kit to be carried on the man for all deck issues of which the forty-eight hours' ration and emergency ration are the bulkiest. Training on exercises, route marches and on scrambling nets and craft must in all cases be carried out with the full load to be carried on the man. Extra weight, i.e. a brick, etc., may be included to take up space and weight of rations to be carried:

(2) *M.T.*—(a) M.T. must be landed tactically, i.e. the stores required first should be loaded in the trucks being unloaded first.

(b) In all cases try to duplicate stores not only in two different trucks, but also where possible in trucks going in two different ships. A medical unit which loses part of its equipment and has not a reserve elsewhere may become incapable of functioning. For this reason it is always wise to carry in a Light Scale A.D.S. and Light Scale M.D.S. on a man pack basis to guard against loss or delay in arrival of M.T.

(c) Valuable equipment should always be waterproofed. The microscope lenses should always be carried in a box containing a desiccating medium, since in tropical climates the holds of ships, etc., may become very humid. Microscope box should always be waterproofed with luting.

(d) *Weights and Loads* : Always ascertain from A.M.L.O. the heights and the weights allowed for loads of each truck and how high these trucks can be loaded. Medical stores are always bulky rather than heavy and if they are

being loaded in trucks with hoods down the load will be correspondingly decreased.

In L.S.T. and L.C.T. height of vehicle is not a major consideration; in M.T. ships it is. In certain M.T. ships the weight of loads in trucks is often restricted, i.e. only a certain proportion of 3-ton trucks can be loaded to full weight capacity, the remainder only being allowed to be loaded to 1-ton load.

(e) *Ambulance Loading* : Ambulances are good load carriers for medical equipment since they have a fixed height—landing if practised can be very satisfactory. The following practical points have been found effective and necessary in the standard 4 × 4 Chevrolet ambulance.

(i) Seat cushions must be removed and stacked forward beside cupboards. When time permits the back rests of the seats can also be bound with scrim garnishing to protect the leather.

(ii) The tall cupboards can be used to carry shell dressings up to 300, or the equivalent, including kitbags for packing them in on arrival at destination. (N.B.—120 shell dressings to one kitbag.)

(iii) Thomas splints and Cramer wire can be stacked on either side of the cupboards.

(iv) An ambulance as specified will carry 6 panniers at least on either side and four panniers, or equivalent, in the centre. In addition 4 extra stretchers on floor and 30-60 blankets CAN BE CARRIED and leave room for kitbags of dressings on top and drums of D.D.T. at rear on floor.

(3) *Equipment Man Pack*.—(a) Every pack must be clearly numbered and the contents known to all men in the section.

(b) If available waterproof jaconet should be used to stitch up all equipment in a compact block which can then be slid into the pack.

(c) With the Bergen or Everest pack it is possible that there will be sufficient room for the men to carry their reserve rations at the bottom.

(d) Important equipment (non-expendable) should be carried by responsible men.

(e) It is impracticable to carry Holman or ordinary suspension bars on a man-pack basis. With standard Mark II stretchers a suspension appliance which is quite adequate can be improvised by use of a second footpiece reversed to point downwards under the Thomas splint and lashed to a cross-bar of wood on the stretcher.

(f) Carriage and storage of water is difficult on a man-pack basis. Additional ground sheets are normally carried for making a shelter. One or more of these can be used to make a water tank. Water carriage, after disembarkation, is best carried out by chaguls but it must be remembered that these must be soaked in water during the last three days on board ship prior to the assault. Sinking them previous to embarking is not satisfactory.

IV.—SHIPPING : LIFE ON BOARD SHIP.

For a long sea voyage various problems occur for which the Unit Commander must make provision during the mounting phase. Of these the two greatest to contend with are boredom and physical fitness.

(1) *Boredom* must be counteracted at all costs. This may be done by the following :—

(a) *Organized Training* : A sufficiency of dressings, etc., should be taken aboard for use for first-aid training on board. Lectures should be instituted and, if allowed, a small blackboard taken. Instruction on map reading including full discussions of the unit's role in the operation can be carried out. A lecture on hygiene and also one on what to do if taken prisoner are of great value.

(b) *Amenities* : Every unit should be prepared to take a certain amount of games and books on board for Indian Troops. In most ships there is a British Troop library. These games will be jettisoned at the end of the voyage or handed over to the ship.

(2) *Physical Fitness*.—(a) Regular P.T. must be instituted though owing to limited deck space it will have to be done in small squads "staggered" over the day, i.e. at different times.

(b) Deck games can be used to exercise a proportion of men.

(c) All men must wear boots for at least four to six hours a day whether the ship's Captain likes it or not. This must also be enforced for personnel employed as cooks, etc.

(3) *Welfare I.T.*—Several troopships used in this theatre may be unaccustomed to carrying I.O.R.s and will require assistance and guidance in making arrangements for I.T. cooking, etc. Unit Commanders are well advised to make it their first duty to check up every arrangement made for feeding their troops. Innumerable "snags" may arise which must be dealt with on the first day or the men become discontented. Usually the Messing Officer takes about twenty-four hours to find out the various implications of his job.

(4) *Mepacrine Discipline*.—It is most important that every man should get his daily mepacrine throughout the voyage. It is sometimes difficult to get all men together and by far the best time for mepacrine to be administered is immediately after the Ship's Captain's Inspection and Boat Stations usually held at 10.00 hours daily. A nominal roll of those employed, e.g. cookhouse or deck duties, should be made and the administration of mepacrine to them afterwards personally supervised by an officer. It is advisable to recommend that all men have a boost dose of two tablets daily for the last three days prior to disembarkation.

V.—ASSAULT.

(a) *Preparation* : All medical personnel must check their kit, especially if on man-pack basis, to see that it is secure for going down scrambling nets. Picks or shovels should be carried down the back between shoulder blades. Stretchers should be firmly tied. For those stretchers which are going to be loaded into L.C.A. down scrambling nets a sufficient length of rope must be available for lowering stretchers down to the L.C.A. It is queer but apparently occasionally true that the ship's crew is unable to provide rope as and where required.

(b) *The Landing* : Men on the man-pack basis are usually top heavy and

it is advisable if one wishes to keep one's equipment dry to detail two men to stand in the water on either side of the craft to steady men getting out quickly. Often R.N./R.I.N. personnel will help in this.

(c) The medical detachment landing with the assault has the primary job of getting clear of the beach and setting up in support of the attacking troops and this must be done. The treatment of casualties actually occurring on the beach must not be allowed to interfere with this main object. However, if the attack is not planned to extend rapidly inland the M.O. i/c Light Section may be prepared to detail one B.O.R. or nursing sepoy and 2 I.O.R.s to remain on the beach and dress cases and draw them above high-tide mark until Beach Aid Posts (part of the Beach Medical Unit) arrive.

(d) Casualties occurring on the beaches are always a bone of contention. Men of the unit concerned naturally do not like to see them lying there untreated and yet it is their duty to proceed as fast as possible.

It is absolutely necessary that the assaulting battalion details personnel landed in the first wave for the duty of treating cases injured on the beach and drawing them above high-tide mark. This latter is very necessary since practically every assault is carried out on a rising tide and a casualty may be unable to prevent himself being drowned. For this job the Battalion Medical Sergeant or Havildar and one or two stretcher bearers are sufficient. In the event of large numbers of casualties these men will have to be reinforced by the stretcher bearers attached to Companies. On the arrival of the R.M.O. on the beach the Medical Sergeant/Havildar should report to him any bad cases. At this time the Beach Aid Post should have arrived and will be able to take over care of the casualties occurring on the beach. If they have not arrived the Light Section of the Field Ambulance if located sufficiently near the beach can take over care of bad cases.

Casualties occurring in landing craft should be taken back to the ships for treatment there. This is not always desirous since it means that men waiting to be ferried in to the beach may have their morale shaken if they see cases coming back badly injured in the boats in which they are about to embark. Also it slows down the ferry service. After the initial assault it is often possible, depending on conditions, to relieve the Navy of these casualties.

(e) *Evacuation from Assault Light Sections of Field Ambulance* : It is never possible to make an absolute firm plan and it is better to give the Section Commander, prior to the assault, a rough plan of the evacuation methods and routes intended to be used and then finally to fix this on disembarkation of M.D.S. when conditions will be more fully appreciated.

(f) Briefing of Light Section Commanders is often a difficult job since they usually embark on another ship with the battalion they are attached to and sometimes from another port. Since these men cannot be put on the X.O. List till actually embarked the Field Ambulance Commander is faced with either visiting the O.C. Section on board ship or giving very full instructions in writing, preferably through the medium of the Brigade administration order Medical Paragraph and Unit Brief by the Brigade.

VI.—FOLLOW-UP

The task of the follow-up Brigade Field Ambulance is easier since once the Brigade is ashore and concentrated it becomes normal land warfare with certain obvious restrictions of supply and transport. However, all must be prepared and loaded tactically in order that they can carry out their job if there is a sudden change of plan and the follow-up brigade does a sudden unplanned assault on another beach, i.e. a "scramble landing."

For this reason it is usually advisable for the O.C. Field Ambulance to travel with Brigade H.Q. so that he is in immediate touch with any last-minute change of plan.

The landing of troops of the latter phases of the assault and of the whole of the follow-up is more often done by L.C.I.(L.). This is not always done according to the book and if opposition is slight the L.C.I.(L.) is liable to be overloaded, often causing indiscriminate mixing of serials. All men must be split into squads under N.C.O.s and not move without their N.C.O. Often also the L.C.I.(L.) cannot go right into the beach and a further ferry service by L.C.A.s is instituted which causes a further risk of Unit personnel being mixed in with other units. This is very liable to happen with the sepoy who, when on a ship, is liable to obey orders from anyone.

VII.—NOTES ON PERSONNEL EQUIPMENT.

(1) It is advisable for all ranks, combatant and medical, to carry one shelling dressing per man. This can be carried without difficulty underneath the camouflage net on the brim of a steel helmet.

(2) Such combatant and medical personnel who carry Tubonic morphia are liable to have these loose in the pockets with highly possible risks of loss of sterility or breakage. The best place to carry Tubonic morphia ampoules is inside the first field dressing packet between the two dressings. The dressing outer envelope can be easily stitched up again and the ampoules will be well protected.

(3) Every man should carry a toggle rope or bed line in lieu and a clasp knife.

VIII.—HYGIENE.

It is all important that all troops are made to realize the importance of organized hygiene and sanitation on the beach-head and this organization must start as early as possible in the assault phase. If no organized sanitation is set up the beach-head area becomes very fouled early on and may delay the final setting up of the B.M.A. dumps.

The hygiene subsection landing with the assault and follow-up Field Ambulance should not be employed on work for the field ambulance but should immediately start work on a common latrine and waste dump area, preferably in the location of the personnel transit area. This area should be planned previously in consultation with the Beach Group Commander. The hygiene section should carry with them yellow latrine flags and signs to direct personnel to this area.

IX.—CASUALTY EVACUATION CRAFT.

Occasionally a Brigade Group may be called on to establish a separate beach-head without the use of a beach group. In this case the Field Ambulance Commander will have to set up a beach-head A.D.S. to act as casualty evacuation point, a task normally carried out by the beach medical unit. In this case the following points are worthy of consideration :—

(a) *Choice of Craft* : L.C.A.s are best for evacuation of casualties since they have a shallow draught and most are fitted with awnings giving protection against sun and rain. L.C.M. and L.C.T. are in most cases incapable of being covered in and become very hot and uncomfortable for casualties.

(b) Times of evacuation are often dependent on tide and this is especially so in operations up chaungs.

(c) It is essential that special L.C.A.s are allotted to isolated Field Ambulances for casualty evacuation. Relying on craft being supplied as and when required always causes delay.

These craft should be staffed with a B.O.R. or nursing sepoy and another sepoy and should carry extra water and comforts and a surgical haversack. They should also have a small Red Cross flag to identify them to R.N. Ferry Control and to medical personnel ashore.

Unless these craft carry some form of staff the arrangements for return of stretchers, blankets, etc., always breaks down.

X.—SUMMARY.

A short paper intended to bring out points of interest and practical use in considering the mounting of a Field Ambulance for a Combined Operation. In order that the paper may be restricted in length no discussion has been made on the actual distribution of personnel and types of equipment, both of which are dependent on the actual operational plan.

AN INVESTIGATION OF FEET IN TRENTHAM MILITARY CAMP WITH SPECIAL REFERENCE TO FUNGUS INFECTION.

BY

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[Received February 20, 1946.]

ROUTINE foot inspections showed that a considerable number of the men were suffering from lesions of the skin between their toes. This raised two questions: first, what was the general state of the feet, and second, what proportion of the men with abnormalities of the skin between their toes were actually suffering from fungus infection.

This investigation, arranged by Lieutenant-Colonel F. W. Kemp, Senior Medical Officer, was undertaken to find the incidence of abnormalities of the skin between the toes and to determine what percentage of them was due to fungus infection. It was made at Trentham Military Camp between December, 1943, and February, 1944. It covered the examination of 2,008 men belonging to the various units in camp during that period; 1,276 or 63 per cent of whom were found to have abnormalities of the skin between the toes.

METHOD OF INVESTIGATION AND OF CLASSIFICATION OF FINDINGS.

Personnel were paraded as far as possible by units and all the feet were inspected personally by the medical officer carrying out the investigation.

Clinically, the findings were classified as: no abnormality (A1), hyperidrosis (H), and those with abnormalities of the skin between the toes. This last group were regarded as being suspect for fungus infection.

Certain abnormalities of the skin of the soles of the feet were observed: sweating, scalding, and sometimes slight erosion of the skin. Where any of these were present, irrespective of the state of the skin in between their toes, the feet were considered to be hyperidrotic.

The abnormalities of the skin between the toes were classified clinically as macerated (M), scaling (S), fissured (F), vesicular (V) and combinations of these. This classification was chosen for its simplicity and follows that used by Linn and Margery [1] of Adelaide.

Those suspect for fungus infection were seen by the chiropodists who, working under the supervision of the medical officer, took scrapings for microscopic examination. These scrapings were taken from the more active part or margin of the lesion and included the deeper layers of the skin [2].

Scrapings were taken directly into liquor potasae B.P., a 5 per cent aqueous solution, and slides were made and examined within two to eighteen hours. The structures were found not to change between those periods and seven days. Scrapings have been treated by different investigators in as high as 20 to 30 per cent caustic potash for as long as twenty-four hours before microscopy.

Where lesions were present in more than one interdigital cleft and where different clinical types of lesions were co-existing, representative scrapings were taken and examined. Before a specimen was regarded as negative for fungus at least four slides were examined. In microscopic diagnosis preparations with mosaics and spores were regarded as negative. Only those preparations which showed definite branching mycelial threads were recorded as positive [4, 5]. No attempt was made to differentiate between different species of fungi [2, 5], and in the absence of adequate facilities no cultural studies were attempted.

There were many difficulties to be overcome due to the fact that Trentham is chiefly a mobilization camp with a moving population. Thus it was not always possible to collect specimens from every suspect.

THE FINDINGS OF THE INVESTIGATION.

A complete record of personnel inspected, their units and the clinical and microscopical findings has been made and the findings are summarized in the following tables :—

Table I summarizes the total inspections, the percentage of suspects, the number of suspects examined, and the percentage of them in which fungus was present.

TABLE I.

<i>Total inspected</i>	<i>Suspects</i>	<i>Non-suspects</i>	<i>Suspects examined</i>	<i>Positives</i>	<i>Non-positives</i>
2,008	1,276	732	1,049	94	955
	63·6%	36·4%		8·9%	91·1%

Table II summarizes the findings in a group of WAACS.

TABLE II.

<i>Total inspected</i>	<i>Suspects</i>	<i>Non-suspects</i>	<i>Suspects examined</i>	<i>Positives</i>	<i>Non-positives</i>
174	36	138	22	0	22
	20·7%	79·3%		0%	100%

Table III summarizes the findings in a furlough draft.

TABLE III.

<i>Total inspected</i>	<i>Suspects</i>	<i>Non-suspects</i>	<i>Suspects examined</i>	<i>Positives</i>	<i>Non-positives</i>
261	191	70	186	5	181
	73·2%	26·8%		2·7%	97·3%

Table IV summarizes the findings in personnel exclusive of WAACS and the furlough draft.

TABLE IV.

<i>Total inspected</i>	<i>Suspects</i>	<i>Non-suspects</i>	<i>Suspects examined</i>	<i>Positives</i>	<i>Non-positives</i>
1,573	1,047	526	843	89	754
	66·1%	33·9%		10·5%	89·5%

In the following table the clinical findings are analysed. A summary is given of the number of suspects with each type of clinical finding and of the number of cases in which fungus was found with each type of clinical finding.

TABLE V.

			<i>M</i>	<i>MF</i>	<i>MS</i>	<i>S</i>	<i>FS</i>	<i>MSF</i>	<i>F</i>	<i>VS</i>
Suspects ..	..	..	656	109	263	174	34	19	18	3
Positives ..	..	..	29	20	17	14	8	4	1	1
Non-positives ..	..	..	478	71	217	140	26	8	13	2

Hyperidrosis was present in 334 cases, or 16.6 per cent of the total number inspected. Hyperidrosis alone was present in 218 cases or 28.4 per cent of the non-suspects. It was present in 116 cases, or 9 per cent of the suspects, and in 4 cases, or 4.3 per cent of those in whom fungus was found.

DISCUSSION OF FINDINGS.

Of the 2,008 pairs of feet inspected, 63.6 per cent, nearly two-thirds (Table I) had abnormalities of the skin between the toes; that is, were suspect fungus infection. These findings accord with those in large institutional groups studied in other countries [1, 3, 6].

In this investigation, of the 1,049 suspects examined microscopically, 94 or 8.9 per cent were positive. In every one of these positive cases, the mycelial threads were present in one or both of the first two slides examined as well as in the last two. Results of microscopy have varied greatly with the different groups investigated in different countries and by different investigators [7]. At Woodside Military Camp, Australia, of 402 suspects examined only 7 or 1.7 per cent were microscopically positive [1]; at the University of Pennsylvania [6] 70.1 per cent of suspects, and at the University of California [3] 90 per cent of suspects were microscopically positive.

Two units, the WAACS and the furlough draft, when taken separately provide additional facts for consideration. Only 20.7 per cent or 36 out of the 174 WAACS inspected showed any abnormalities of the skin between the toes and among those no positives were found. Other observers [2, 3, 8] have commented on the much lower incidence of fungus infection of the feet among women.

The furlough draft, like the WAACS, were quartered as a unit completely separate from the other units, but unlike the WAACS, who had been in camp for some time when inspected, had just returned from six months' furlough. As opposed to the rest of the camp, men who had been living together and had been training hard, they were comparable with a civilian group. The only difference was that having been trained troops they had a good knowledge of foot hygiene. Of the furlough draft, a large number, 191 or 73.2 per cent, had abnormalities of the skin between the toes, yet only 5 or 2.7 per cent of the 186 suspects examined were positive. Clinically, the lesions of these two groups differed in no way from those of the rest of the feet examined.

Excluding these two special groups, the WAACS and the furlough draft, of the 1,573 men inspected, 1,047 or 66.1 per cent were suspect fungus

infection, and of the 843 suspects examined, 89 or 10·5 per cent were positive.

Thus, compared with the rest of the troops, the furlough draft had a higher percentage of men with abnormalities of the skin between the toes, but a far lower percentage with fungus infection.

Excluding the WAACS and the furlough draft, the incidence of positive and of non-positive suspects was no greater in any one unit than in any other.

That the positive cases were so evenly distributed and so small in number, compared with the cases with abnormalities of the skin between the toes, suggests that the fungus is not so infectious as it has been suspected to be. It supports the suggestion that individual susceptibility may play an important part in determining whether or not a given person exposed to infection by the fungus is going to become infected [9].

Detailed analysis of the clinical findings (Table V) showed what was obvious clinically—that there were no clinical features characteristic of ringworm infection. This observation agrees with those of many investigators [1, 2, 5, 10]. Some of them claim, however, to be able to make a clinical diagnosis of ringworm of the feet in a certain number of cases [3, 4, 6, 7, 9, 11.] Severity of the lesion was also found to be no guide as to the presence of fungus infection. Some of the most severe lesions proved persistently negative to repeated microscopic examinations, while in some of the mildest lesions the mycelial threads of the fungus abounded.

Several investigators have isolated fungi from apparently normal skin of the interdigital spaces [8, 12, 13]. These fungi have had the cultural characteristics of pathogenic fungi and some have actually produced lesions following their inoculation on healthy skin. Strickler and Friedman [12] regard this group of individuals negative clinically but positive microscopically as carriers themselves liable to the disease. They maintain too, that these people provide a potent source of danger to the community. In this investigation, microscopic examination of the scrapings from the interdigital clefts of 16 men with no abnormalities of the skin between their toes but with raw sweaty feet failed to reveal any fungi. Van Graffenried [5] has found it difficult to produce ringworm experimentally by inoculating intact skin with these fungi which have been proven pathogenic. When the skin of the interdigital clefts has been traumatized prior to the inoculation, a clinical ringworm soon develops.

Only 334 or 16·6 per cent of those inspected were considered to suffer from hyperhidrosis. Of these, 218 were non-suspects, and only 116 suspect for fungus infection. That is 28·4 per cent of the non-suspects and only 9 per cent of the suspects had evidence of excessively sweaty feet. Thus, this investigation fails to show a greater incidence either of abnormalities of the skin between the toes or of fungus infection in those whose feet sweat excessively. This is contrary to generally accepted opinion [5, 9], but is in keeping with the actual findings of M. Schramek [14] and does suggest that the importance of excessive sweating in itself as a causal factor in these lesions has been overestimated, possibly because of a tendency to trust to general impressions rather than to facts obtained from careful investigation.

It was noted that the abnormalities of the skin were most marked and most constantly found in the fourth interdigital cleft. This agrees with the findings of other observers and has been accounted for on the following grounds. First, it is the least easily cleaned and dried interdigital cleft. Secondly, by reason of its position, it is the cleft most liable to suffer friction and trauma. Thirdly, the sweat glands here produce a less alkaline secretion than in the other clefts [15], even though the glands here differ morphologically in no way from the glands of the other clefts [5].

It was noted too that feet with well-spread mobile toes rarely had unhealthy skin.

In only a very few instances were the lesions severe enough to interfere with training. In most cases, until well advanced, the lesions were symptomless. This, together with the fact that so many of the men had had such lesions off and on for years and did not regard them as abnormal, largely accounted for the high incidence of abnormalities found.

The causation of the lesions in the 955 suspects shown to be non-positive was not determined. It has been established that there are a number of conditions which can simulate ringworm of the feet so exactly as to render clinical differentiation impossible. These include parasitic infections by yeasts [5], and by bacteria [5, 6, 11, 16], a non-eczematous condition of the skin, and an intertrigo due to combinations of lack of cleanliness, trauma, excessive sweating, and chemical irritation; the most common causes of the latter being the soap alkalies left in socks not properly rinsed and in certain occupations.

CONCLUSIONS.

(1) The incidence of abnormalities between the toes of men in Trentham Camp was fairly high, approximately two-thirds of the 2,008 men inspected.

(2) In very few cases were the lesions severe enough to interfere with training.

(3) Though the incidence of abnormalities between the toes was high, that of fungus infection was relatively low. In only 94 or 8.9 per cent of the suspects examined was the fungus demonstrated microscopically.

(4) It was impossible to distinguish clinically lesions due to fungus and those due to other causes.

(5) Hyperidrosis was not an important factor in the ætiology of abnormalities of the skin of the interdigital clefts whether due to fungus or to other causes.

(6) No case of infection with fungus was found in the WAACS.

(7) The furlough draft had only recently returned to camp from, and could be regarded as subject to, civilian conditions. It showed a slightly higher incidence of abnormalities of the skin of the interdigital clefts but only 5 of the 261 inspected had infection with fungus.

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W.O.II F. W. Heal and the Staff of the C.D. Hospital for help in the preparation and examination of the specimens ; and the Chiropodists, Sjt. McCormac and Cpl. A. Bailey, in the taking of specimens and the treatment of the non-positive cases.

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TREATMENT OF TYPHOID FEVER WITH CONVALESCENT WHOLE BLOOD.

BY

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TREATMENT of enteric fever to-day largely remains where the treatment of pneumonia lay before the introduction of the sulphonamides, good nursing usually making the largest contribution towards a successful outcome. Jordan and Jones [1] in their recent description of an outbreak of typhoid in a unit of the B.L.A. suggest that previous inoculation with T.A.B. makes little difference to the severity of the disease once it gains hold and, whilst an effective chemotherapeutic agent doubtless will be found, there is still some interest in the various forms of serotherapy. These comprise, on the one hand, the administration of serum from immunized animals, especially of Felix's Vi serum and, on the other hand, human immuno-transfusion in which the blood or serum used comes from donors who have either been inoculated with typhoid vaccine or who are convalescent from the disease. The present account deals solely with cases treated by this last method. In accounts previously published the results have on the whole been encouraging, though very uneven, and the treatment has been instituted relatively late when its value is correspondingly more difficult to assess. In the following small series the results are less encouraging but mostly clear-cut and the treatment has been given in the second rather than in the third week of the disease.

The mortality in typhoid probably varies much in different outbreaks and in different nationalities so that, if it is to be used as a criterion of the efficiency of any remedy, both suitable controls and a large series of cases are required. The duration of the pyrexia on the other hand varies with these circumstances less and, while it is not denied that instances do occur of expansion at both ends of the scale, one can regard Jordan and Jones' series as representative, where the duration of pyrexia ranged from 11 days to 68+ and averaged 25. Accordingly, just as the value of sulphathiazole in pneumonia can be judged by its success in bringing the temperature to normal within forty-eight hours, provided it be administered in the first few days, so a really successful remedy for typhoid should dispel the fever within similar time provided it be administered in the first fortnight.

The following table summarizes the main points in the results of earlier attempts at treatment with convalescent blood or serum. In the various publications important details, especially as to the temperature, have sometimes been lacking and, as is so often the case with typhoid, the precise time of onset was often not known. Accordingly the response to the specific treatment has been marked as ++, +, \pm or 0, as judged from the authors' descriptions; ++ indicates complete and continued cessation of fever within forty-eight hours of first administration of the fluid; + indicates resolution of fever by lysis, beginning within three days of first administration and

complete within seven ; \pm indicates an improvement in well-being only and 0 means no response.

<i>Authors</i>	<i>Number of cases</i>	<i>Age</i>	<i>Day of disease when treatment was begun</i>	<i>Quantities in c.c. (S = Serum B = Blood)</i>	<i>Response</i>	<i>Remarks</i>
Garbat [2] (1916)	3	(1) 12 (2) 30 (3) 32	15 19 16	S 50, 50, 30 S 100, 75, 100	+ \pm +	Died later
Tremolières <i>et al.</i> [3] (1930)	3	(1) Adult (2) Adult (3) Adult	15-21 24 ?	B 190 B 150 B 300	+ ++ +	Died later { of gangrene
Villaret <i>et al.</i> [4] (1931)	1	44	35	B 50, 50, 50, 50	\pm	Para B in- fection
Laeper <i>et al.</i> [5] (1931)	1	20	17	B 380, 300	++	
Rouèche [6] (1933)	1	4½	40	B 10, 20, 30	\pm	
Eschbach [7] (1933)	1	10	15-21	B 20	+	
Griffin [8] (1937)	1	6	6	B 5	+	
Lautin <i>et al.</i> [9] (1939)	7	?	?	S 20 several times, 5 cases ? intramuscu- 2 cases 0 Died larly	+	
Lautin <i>et al.</i> [9] (1939)	10	?	?	S 20 several times, 8 cases ? intravenously 2 cases 0 Died	+	

It will be seen that the mean day of disease on which treatment began was 18, and that the only two cases in which improvement was really dramatic first received convalescent blood on the 17th and 24th day respectively. One may summarize these results and conclude that dramatic response has been rare and considerable improvement fairly common but that, owing to the late stage at which specific treatment has been instituted, it is difficult to exclude coincidence, or to deny that equally good results might have been obtained by non-specific blood transfusions.

The small series now to be described was not part of a single epidemic and, although phage typing was not practicable at the time, undoubtedly several different sources of infection and strains of organism were involved. Indeed, the only "epidemic" encountered was amongst Polish ex-prisoners of war of whom some 30 were treated in the hospital for enteric fever. The British troops in the area (Palestine) were in excellent physical condition and usually up to date with their T.A.B. vaccination (non-alcoholized type) ; the incidence of enteric amongst them was small but the course of the disease when it did arise was apt to be severe even in men recently inoculated. The Poles on the other hand were mostly in rather poor physical shape and with doubtful histories of typhoid inoculation, yet the cases were nearly all mild and the mortality small. Full records of both donors and recipients are given at the end but in the meantime a few general remarks are apposite and a table is

given to allow comparison with the results already published. Except for one donor, in every case typhoid fever had been proved in both donor and recipient by the growth of *E. typhosus* from the blood or the urine. Most of the donors had also had their usual T.A.B. inoculation within the last twelve months. In all recipients a reaction, sometimes severe, followed the transfusion. Arrangements in the hospital at this time for elimination of pyrogens from apparatus and anti-coagulant fluids used for blood transfusions were not satisfactory, for reactions amongst patients transfused for other reasons were fairly common; it was not necessary to suspect a specific effect of the immune blood. In no case was the blood stored; it was always taken into 3.8 per cent sodium citrate solution and transfused by drip method immediately. None of the reactions were due to incompatibility.

The results of the transfusions were as follows:—

Case	Age	Day of disease when transfusion was given	Time in days since donor became afebrile	Quantity in c.c.	Response	Remarks
(1) H. N. Pte., Czech Army	25	11	31	540	+	
(2) C. J. F. L/Cpl., Brit. Army	29	(1) ?12 ?36 (2) ?16 ?40	30 8	540 250	0 ++	Donor a "clinical enteric" only
(3) T. K. Pte., Polish Army	30	?12	47	300	++	
(4) J. W. L.A.C., R.A.F.	22	10	18	250	0	Died within 24 hours
(5) N. H. Gnr., Brit. Army	36	9	108	300	0	Blood culture positive 2 days later. Fever lasted 68 days, including 2 relapses
(6) S. A. Lt., Italian Army	29	15	5	400	0	Fever lasted 56 days including 1 relapse
(7) N. K. L/Cpl., Greek Air Force	31	17	37	140	0	Fever lasted 28 days

N.B. (1) The same donor was used for Case 5 as for the second transfusion of Case 2, but at a much later date.

(2) Case 2 after recovery served as donor for Case 6.

DISCUSSION.

These transfusions were certainly very troublesome. It was necessary to maintain a panel of potential donors still available in hospital, convalescent depot or neighbouring unit, to have their blood groups determined, Kahn tests performed, and all history of malaria and infective hepatitis excluded. The results can only be described as poor. The transfusions were not given in the late stages of the disease to compensate for a post-hæmorrhagic anæmia or to act as general "tonic" to an exhausted and toxæmic patient; on the

contrary, they were given as early in the disease as proved practicable with the precise intention of providing specific antibodies against the infecting organism and of aborting, if possible, the progress of the malady, and this they conspicuously failed to do. Five out of the eight transfusions performed had no demonstrable beneficial effect whatever; in one case where the response appeared to be dramatic the same donor at a later date was quite without influence upon an apparently even more suitable recipient and, finally, in one of the patients (Case 4) the reaction which followed the transfusion probably contributed towards the circulatory collapse which preceded his death. These conclusions agree with those of Nicolle and Conseil [10], of Emile-Weil [11], and of Hansch and Hartmann [12], all of whom failed to detect any difference between the results of giving ordinary blood and of any form of immuno-transfusion. Blood transfusion is certainly of great value in the treatment of typhoid fever complicated by hæmorrhage, and it is possible that small quantities slowly given to other cases can do good, but there is as yet no satisfactory evidence that blood from convalescents can be regarded as a reliable specific.

CASE HISTORIES.

Case 1.—H. N., Private in Czech Army. Aged 25. Typhoid vaccination: once in 1940, dose unknown. Blood group A/2. Onset 27.6.42. Blood culture taken 3.7.42; *E. typhosus* isolated. Continued fever to 103°. Transfused 540 c.c. on 7.7.42. Rigor followed. Temperature fell by lysis; no rise after 11.7.42.

Donor: W. R., Private in Polish Army. Aged 25. Blood group A/2. Onset 27.4.42. Blood culture taken 7.8.42; *E. typhosus* isolated. Continued fever to 104°. Disease of moderate severity. Routine treatment. Temperature normal by 28.5.42 but a 36-hour relapse on 5.6.42.

Case 2.—C. J. F., Lance/Corporal in British Army. Aged 29. T.A.B. vaccination $\frac{1}{2}$ c.c. on 13.6.41 and 1 c.c. on 27.6.41. Blood group A/2. Fever with bronchitis from 14.7.42 to 1.8.42; apparent response to sulphapyridine. Return of fever on 8.8.42, reaching 104°. Blood culture taken 15.8.42; *E. typhosus* isolated. Transfused 540 c.c. on 19.8.42; rigor (T. 106°) followed. Fever 102° continued daily. Melæna. Further blood transfusion 250 c.c. on 24.8.42; again rigor. Temperature normal on 25.8.42 and no further fever except slight rise on 27.8.42, due to a sterile pleural effusion.

1st Donor: J. M., Private in British Army. Aged 22. T.A.B. vaccination 14.8.41. Blood group A/2. Onset 14.6.42. Continued fever to 104° with mild diarrhoea and enlarged spleen. W.B.C. 13,400; P. 78, L. 20, M. 2. Culture of blood, stools and urine negative. No agglutination to *E. typhosus* or Para B ("O" type), nor to *Br. melitensis* and *abortus*. No malaria parasites. No response to sulphanilamide. Temperature normal after 19.7.42.

2nd Donor: W. G., Corporal in Royal Air Force. Aged 25. T.A.B. vaccination 1 c.c. in 1940. Blood group A/2. Onset 5.7.42. Blood culture taken 22.7.42; *E. typhosus* grown. Temperature finally normal, after relapse, on 15.8.42.

Case 3.—T. K., Private in Polish Army. Aged 30. Blood group O/4. Date of onset not exactly known, possibly 31.7.42. Fever 104°. Blood culture taken 7.8.42; *E. typhosus* isolated. Blood transfusion 300 c.c. on 11.8.42; rigor (T. 105.4°) followed. Temperature fell next day to normal and remained so.

Donor: J. S., L.A.C. in Royal Air Force. Aged 29. Blood group O/4. Onset about 4.5.42. Blood culture taken on 13.5.42; *E. typhosus* isolated. Temperature normal after 25.5.42.

Case 4.—J. W., L.A.C. in Royal Air Force. Aged 22. T.A.B. vaccination: $\frac{1}{2}$ c.c. May, 1941, and $\frac{1}{2}$ c.c. March, 1942. Blood group A/2. Onset 16.8.42. Fever rising to

105°. Blood culture taken 22.8.42; *E. typhosus* isolated. Blood transfusion 250 c.c. on 25.8.42. Rigor and later circulatory collapse and terminal jaundice. Died seventeen hours later. Blood incompatibility re-checked and excluded.

Donor: T. H. S., L.A.C. in Royal Air Force. Aged 24. T.A.B. vaccination last in December, 1941. Blood group O/4. Onset 29.5.42. Severe case treated by non-specific blood transfusions on 30.6.42 and 14.7.42. Urine culture on 23.7.42; *E. typhosus* isolated. Fever ceased on 7.8.42. Serum agglutination against *E. typhosus* ("O" type) positive 1/500.

Case 5.—N. H., Gunner in British Army. Aged 36. Blood group A/2. Onset 23.11.42. Fever to 104°. Blood culture taken 27.11.42; *E. typhosus* isolated. Transfused 300 c.c. on 1.12.42; rigor (T. 105.8°) followed. No improvement after it, temperature remaining at 103° and toxæmia steadily increasing. Blood culture again positive 3.12.42. Severe course with two relapses, lasting in all 68 days.

Donor: W. G., already used with apparent success as 2nd donor to Case 2.

Case 6.—S. A., Lieutenant, Italian prisoner of war. Aged 29. Never inoculated against enteric. Blood group A/2. Onset 16.9.42. Continued fever to 104°. Blood culture taken 25.9.42; non-motile strain of *E. typhosus* isolated. Serum agglutination on 29.9.42 against *E. typhosus* ("O" type) positive 1/480. Transfused 400 c.c. on 30.9.42; rigor (T. 106°) followed. Later, temperature fell to 95° but rose again to 103° and continued so for another 12 days; later a 25-day relapse occurred. Blood culture on 1.10.42 sterile.

Donor: C. J. F., Case 2.

Case 7.—N. K., Lance/Corporal in Royal Hellenic Air Force. Aged 31. Onset 1.9.42. Fever to 103°. Blood culture taken 14.9.42; *E. typhosus* isolated. Transfused 140 c.c. on 17.9.42. Rigor (T. 107.4°) followed. Temperature next morning 95° but it rose later to 104° and did not become normal until 30.9.42.

Donor: K. L., Lance/Corporal in British Army. Aged 22. T.A.B. vaccination $\frac{1}{2}$ c.c. on 2.10.39, 1 c.c. on 17.10.39 and $\frac{1}{2}$ c.c. on 1.7.41. Blood group O/4. Date of onset not known. Blood culture: *E. typhosus* isolated. Temperature normal after 12.8.42.

SUMMARY.

(1) Eight transfusions of convalescent whole blood were given, as early as was practicable, to 7 cases of typhoid fever, and the results are compared with those in previously published accounts of this form of immuno-transfusion.

(2) Full details of both donors and recipients are given.

(3) It is concluded that as specific treatment of the infection the method is of very doubtful value.

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DIVISIONAL PSYCHIATRY. REPORT TO THE WAR OFFICE.

BY

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THIS report has been based on my experiences as psychiatrist attached to the H.Q. of the 2nd British Division in India, Assam, and Burma from November, 1943, to November, 1945, during which period I served continually with the Division, apart from two periods of three weeks when I was posted on temporary duty.

It has been found difficult to avoid using narrative form in many parts of this report, but I hope that it will be possible to form certain generally valid conclusions from the experiences that I have described, for many of the problems that I met must have presented themselves in one form or another to any psychiatrist working with a Division in wartime.

In order to try and introduce clarity and conciseness I have written the report under the following main headings :—

- I.—INTRODUCTION.
- II.—THE MILITARY HISTORY OF THE BRITISH SECOND DIVISION, 1943-1945.
- III.—THE FUNCTIONS OF THE DIVISIONAL PSYCHIATRIST UNDER NON-BATTLE CONDITIONS.
- IV.—THE FUNCTIONS OF THE DIVISIONAL PSYCHIATRIST IN BATTLE.
- V.—SUMMARY AND CONCLUSIONS.

I.—INTRODUCTION.

It was at the end of the year 1943 that the decision was made by G.H.Q.(I) to allot to every Division in that theatre of war a Divisional Psychiatrist. It was not found possible to follow this procedure in other theatres, but, though I have no direct knowledge of the results obtained or of the work done by psychiatrists allotted on a Corps basis, as in North Africa, Italy, and North-West Europe, it is my opinion that the decision to allot a psychiatrist per Division in S.E.A.C. was fully justified by the results that were obtained.

My own experiences were with British troops only ; the other Divisions in S.E.A.C. were Indian, or East or West African, though 36 Division was for a long time composed of British Combatant troops. So far as I know it was not possible to provide the African Divisions with a psychiatrist : however, a psychiatrist worked with each of the Indian Divisions, and the experiment appears to have been thoroughly successful, to judge by reports that I have read, despite the difficulties of language.

Nevertheless, I must again emphasize the fact that my work was with British troops only, and that such opinions as I formed and such suggestions as I may make are applicable only to a British Division.

At this stage it may be well to consider what experience and qualities are required of a Divisional psychiatrist, if he is to be able to tackle his work efficiently and with confidence.

In the first place, I am convinced that previous experience in a Field Unit is absolutely essential, and would go so far as to say that no psychiatrist should be considered for the job without this qualification, and unless he has already proved himself to be a capable General Duty Medical Officer. In my opinion this is a far more important requisite than an academic background and a profound clinical knowledge of psychiatry. In this particular job it matters much more that the psychiatrist should know the composition of a Brigade, the strength of a Rifle Company in a Battalion, etc., and that he should have, from personal experience, knowledge of, and insight into, the practical difficulties and problems of the soldier, and of the many other facets of Army life which can only be learned from personal contact, than that he should be able to indulge in niceties of clinical diagnosis, such as the differentiation between the hebephrenic and katatonic types of schizophrenia, and so on.

The Divisional psychiatrist will be at a grave disadvantage if he is posted to a Division unequipped with a good general knowledge of military routine, discipline, administration and etiquette.

I was fortunate in that, before joining the 2nd Division, I had acted as R.M.O. to a British Infantry Battalion for over a year, and had had three months' experience with a British Field Ambulance, and six months with an Indian Field Ambulance. I think that six months' such experience is the minimal period for a psychiatrist before he should be posted to a Division, and that if possible he should have served both as a R.M.O. and in a Field Ambulance.

As an example of this, I recollect that very shortly after joining my Division the C.O. of one of the Battalions asked me to examine his R.S.M., and it was amusing to note his surprise and pleasure when he realized that I appreciated exactly how worried he was over this Warrant Officer, and how vital to the morale of the Unit as a whole was the restoration of his mental health. Fortunately I was able to keep the R.S.M. going, and thereafter received the utmost co-operation and assistance from his C.O.

Many other such examples could be quoted, which would serve to illustrate that a general knowledge of the Army is of the greatest value, particularly in the early stages, in helping the psychiatrist to gain the confidence of those with whom he is going to work. It is a real advantage if one can avoid being regarded as "just another academic specialist."

Next, I would stress the social side—in particular the ability to make and maintain as many friends as possible throughout the Division. In the first place, it is possible in this way to become widely known and thus unobtrusively to spread one's "creed" throughout the Division. Secondly, it enables the psychiatrist to feel at home with Units and to gain confidence, whilst the

officers in their turn feel more confidence in the psychiatrist if he is able to mix well with them socially. Thirdly, it may well give one a very good line on the morale of Units, for one can readily detect the atmosphere in a Mess, and, on the basis of this and other information, form the judgment as to whether the officers are settled and harmonious or not.

Finally, I would stress the importance, particularly in the early stages of one's work in a Division, of proceeding carefully, and of using every art and craft of diplomacy and tact.

Every C.O. and M.O. requires to be approached in an individual manner : some will be enthusiastic and helpful in every way, some will be open-minded, some will be downright suspicious of the whole business as being a " racket." In some cases one can go straight ahead, in other cases one has to feel one's way slowly, and circumspection and care are necessary before the barriers are broken down.

I will give as an example a case in which I was guilty of hasty and precipitate action, when I had been with the Division only a short time, and was perhaps too enthusiastic, and, as a result, on this occasion, thoroughly tactless.

I was asked by the A.P.M. to go round the Divisional Detention Barracks with him, and in particular to examine a few men whom he considered were not being improved by punishment or were displaying peculiarities of behaviour. One of these men was an obvious case of severe, long-standing schizophrenia, and I wrote a report to the A.P.M. recommending that the man be admitted to hospital for treatment. I made the mistake of failing to contact the C.O. of his Unit and to discuss the case first with him. The C.O. was quite rightly extremely annoyed, and after this it took me several months before I could really gain the confidence of this Unit !

In general, however, I was extremely fortunate in that I received every help and encouragement from the Divisional Commanders and A.D.s.M.S. under whom I served, and every co-operation from the medical officers and the members of the Division H.Q. staff with whom I was privileged to work.

II.—THE MILITARY HISTORY OF THE BRITISH SECOND DIVISION, 1943-1945.

I think it is worth while to give a brief outline of the history of the 2nd Division during the period in which I was a member of it, in order to present a background to my activities, and to indicate the varying conditions and circumstances under which my experience was gained.

In November, 1943, when I was posted to the Division, it was stationed at Ahmednagar in the Poona area : it had been training for combined operations for a long time, and had reached a very high standard of efficiency in this role. In fact, it was possibly just past its peak, for it must be taken into consideration that it had been training hard and consistently ever since Dunkirk, and that everyone had hoped and expected when they sailed from England in April, 1942, that they were on their way to North Africa to join the 8th Army. Instead of this, the Division arrived in India in June, 1942, and had been training without a let-up ever since.

One Brigade had been committed in the Arakan Campaign in early 1943 : it had sustained fairly heavy casualties, and returned to rejoin the Division

with large numbers of cases of malaria, many of them of the relapsing B.T. type.

The intention had been that the Division should take part in a combined operation early in 1944, but at the very last moment urgent operational needs in Europe necessitated the presence of more landing craft in that theatre, and the operation was cancelled. The Division had been keyed up to a very high pitch and had been very much "on its toes," and was now apparently faced with another long period of further waiting and training.

The A.D.M.S. was well aware of the dangers of staleness and over-training at this stage. He consulted me, but it was as a result of his insight and initiative that plans were made for the Division to have a "rest period." A Brigade at a time were to be stationed near Bangalore, and the aim was to give the troops a maximum of recreation and a minimum of training, in order to "nurse" them through this difficult period. Arrangements were also made to send as many men as possible on fourteen days' leave.

However, this plan was never to reach fulfilment, for scarcely had it begun when in mid-March, 1944, the Japanese offensive against Imphal and Kohima developed, 2nd Division was ordered to mobilize for action, and within three weeks was attacking the Japs 14 miles from Kohima on the Dimapur-Kohima road.

This battle lasted for approximately ten weeks, and was exceptionally bitter and hard fought. The country was precipitate and mountainous, Kohima itself standing at 4,500 feet, and neighbouring ranges rising up to nearly 9,000 feet. The troops had, of course, been trained specifically for Combined Operations.

The Japs were entrenched in a series of extremely strong positions, and their morale and fighting qualities at the beginning of this battle were exceptionally high. Each position had to be stormed and carried, and the casualties were not light. Finally the Japs broke, and the Division advanced very rapidly down the Kohima-Imphal road to link up with troops of 4th Corps 25 miles from Imphal. The road to Imphal, which town had been supplied entirely by air for more than two months, was thus opened.

The monsoon had broken during the early phases of this battle, the rains were at times torrential, and climatic conditions and conditions of terrain imposed a severe strain on the combatant troops.

The total number of killed was approximately 800, and the wounded 2,200. Officer casualties were very high indeed in proportion to other ranks.

After this battle two of the Brigades were committed to further action for some weeks, but not on an extensive scale, being mainly engaged in "mopping-up" operations.

The Division was then stationed on the Kohima-Imphal road until December, 1944, for a period of rest, reorganization, and further training.

Fourteen days' leave was given to as many men as could be arranged, but it was not possible to keep up the morale of the Division to its previous very high level: it was stationed in the Wilds, and though every effort was made by local initiative to provide entertainment and recreation for the troops, an element of increasing staleness soon became evident, and the troops at this

stage began to become "repatriation-conscious," with all that this term implies. The failure of the war in North-West Europe to end in the autumn of 1944 also had a very adverse effect on morale.

Owing to shortage of man-power the reinforcements that were supplied were derived largely from men who had served throughout the war in the R.A., many of them in static A.A. Units. Many of them were in the middle thirties and, though later they did everything that could be expected of them, it is obvious that they could not reach a really high level of efficiency as Infantrymen.

For all these reasons the Division entered on its second Campaign in December, 1944, of necessity a less well-knit, well-trained organization than it had been before Kohima, although morale and team-spirit were still definitely at a high level.

The Division's second Campaign began in mid-December, 1944, with the taking over of the bridgehead over the Chindwin river from the 11th East African Division. The advance towards the Irrawaddy was in the early stages very rapid, and only Jap rearguard parties were encountered. Stronger opposition was met near the Irrawaddy itself, and the Japs had to be driven out of a number of strongly held positions. There was then a period of waiting and building up before we could establish a bridgehead over the Irrawaddy, in conformity with the Corps plan.

The crossing took place at the end of February and was opposed. However, a bridgehead was soon established and expanded, and fairly heavy fighting occurred, Jap artillery being strong at this stage. The Division assisted in the capture of Mandalay, and then advanced South Westwards towards Rangoon.

Two brigades were flown back to India from Myingan early in April, and the third Brigade, having reached the Mount Popa area, was flown out towards the end of April.

The fighting in this campaign, which lasted four months, was rarely so concentrated or bitter as it was at Kohima, and the terrain was for the most part fairly flat. But the Infantryman had to march long distances, water was at times in short supply, and the weather became increasingly hot, the temperature rising up to 112° F., or more, in April each day.

Total casualties were approximately half the number of those sustained at Kohima.

It is interesting to note that the rate of psychiatric battle casualties was much higher in this campaign than at Kohima. In the latter battle they formed 9.7 per cent of total wounded (excluding killed and sick), whereas the corresponding figure for the second campaign was 17.6 per cent.

It had been intended that one or, if necessary, two Brigades should now take part in the Rangoon landings as follow-up troops, but when Rangoon fell without opposition, it became evident that the Division would not be committed to battle again.

It was stationed near Secunderabad to await repatriation, which finally

came in November, 1945. One Brigade did, in fact, go to the Rangoon area, but was only involved in local patrolling activities.

III.—THE FUNCTIONS OF THE DIVISIONAL PSYCHIATRIST UNDER NON-BATTLE CONDITIONS.

This subject will be dealt with under four sub-headings, as follows :—

- (a) *Selection Work.*
- (b) *The Investigation of Morale.*
- (c) *The Spreading of Knowledge of Forward Psychiatry among Medical Officers.*
- (d) *Practical Preparation for Battle.*

I will again deal with these points mainly in narrative form, in order to try and show how it was possible to tackle these problems, under the conditions in which I worked and against the background of the history of the Division, which has already been indicated.

(a) *Selection Work.*—When I was posted to the Division it was generally expected that we might be committed to action in about two months' time, and it seemed to me to be of the greatest importance, before anything else, to do as much selection work as possible, and to dispose of the maximum number of unsatisfactory soldiers by one means or another before we went into action.

My A.D.M.S. was extremely helpful, encouraged me to go straight ahead and work on my own initiative, and was always ready to give me his assistance or advice when I required it.

It at once became evident that the Division, and in particular the Infantry Battalions, contained a very considerable number of men in whom their officers had little or no confidence, and of whom they would be only too glad to dispose. The numbers were noticeably greater in the Brigade which had been committed in the Arakan in 1943 and which had received a good number of unsatisfactory reinforcements.

Each Brigade, and Divisional Troops, were visited in turn. A circular letter, explaining what types of men might be referred for examination, was sent to every Unit, contacts were made, and the principles of selection work were explained. As a result of this, large numbers of dullards, psychoneurotics, and a few psychopaths and psychotics were unearthed. Combatant officers proved to be extremely enthusiastic at the idea of getting rid of these men—more so, in fact, than the medical officers, who in some cases had a valuable sobering effect on too high a degree of enthusiasm—and were quick to appreciate the fact that such men in battle would not only be a liability to themselves, but also might be a positive danger to others, and would certainly have an adverse effect on the general morale of the Unit.

The procedure I adopted was to ask the Company or Platoon Commander to write a relevant report on the man, and to state whether his retention was desired or not. I gave the men the Progressive Matrices test to do, followed by an interview, and in the light of all the information available, decided on their disposal.

I think it is perhaps worth while to mention at this stage that the method of asking for a personal report in the officer's own words on the men referred for examination proved of far more value and gave me much more information than the use of A.F. B183, which was later introduced. By the former method—given, of course, good officers who know their men—much more scope is given, whereas the answers to the set questions on the A.F. B183 are of necessity short and stereotyped, and give the officer little opportunity of saying what he really knows about the man. I realize that this criticism of A.F. B183 is possibly only valid for work at a Divisional level, where there is personal contact between the psychiatrist and combatant officers, and that it may well be a useful form in the case of men referred by units to hospital out-patient departments.

Unfortunately, I am not now in the possession of the exact figures of the number of men referred to me at this period and of their disposal, because many of my records were lost in a typhoon in Burma, and I last saw them at a considerable height being blown rapidly towards China!

Speaking from memory, I should say that in the first six or seven weeks I interviewed rather more than 350 men. Considerably more than half of these were considered to be definitely unsuitable for battle, and were disposed of: approximately two-thirds of the latter were dullards, many of them with superimposed anxiety or hysterical symptoms, and almost all were recommended for transfer to the Pioneer Corps and were disposed of. The remainder of the dullards, and a handful of psychopaths, were not considered likely to be of value to the Army in any capacity and were recommended for admission to hospital, as, of course, were the very few psychotics who were seen. The disposal of the chronic psychoneurotics referred was either recategorization, admission to hospital, or R.T.U.

I think it is not out of place to stress once again how very alive to the importance of selection work the Division proved to be. I came across practically no examples of the attitude of "they are trying to get away with it"—an attitude which, in my experience, becomes more and more prevalent among officers the farther away from the front line they are, and perhaps reaches its acme amongst some Medical Officers at Base Hospitals. The Combatant Officer, who knows his troops, has learned from bitter experience that certain types of men just are constitutionally unable to make the grade and that there is nothing one can do about it. Perhaps the most pertinent criticism on this subject came good-humouredly from the C.O. of a Battalion who asked me: "Why should I send these men to you so that they will survive the war and go home and breed like rabbits, whilst all my finest men are going to risk being killed?" To which I could only reply that, be that as it might, he had referred more men from his Unit than I had seen from any other!

Selection work was continued the whole time, of course, between the two Campaigns, but was never again so concentrated as it was during this early period, although large numbers of the reinforcements were referred for examination.

(b) *The Investigation of Morale.*—Many opportunities are open to the Divisional psychiatrist in this field, and it depends, of course, on the circumstances prevailing at the time as to what particular line it is most profitable to investigate.

First of all I would like to mention the importance of—to use a cliché—“keeping one’s finger on the pulse” of the Division, and the wider one’s contacts, the easier it is to do this unobtrusively. Talks and informal conversations with combatant officers, with R.M.O.s and Field Ambulance officers, with Padres, with members of the Div. H.Q. Staff—in particular the D.A.A.G., G2I, and F.S.O.—and the ability to chat with the troops themselves, all keep one in touch with current problems of morale. This is worth stressing, because during battle (or at any other time) one is likely to be asked one’s opinion about the morale of any Unit : if the state of affairs is already known, this knowledge, together with the information that can be gained from the numbers and types of psychiatric battle casualties occurring, should enable one to give an opinion straight away, and precludes the possible situation arising of a visit to the Unit, perhaps followed by the dismissal of the C.O. or other officers, which is obviously from every point of view most undesirable.

The Divisional Psychiatrist should always know sufficient about every Unit to be able to give his opinion to the Divisional Commander or A.D.M.S. on the spot, and to add his knowledge of the state of affairs to that provided by the staff officers at Headquarters.

Apart from keeping in touch with morale problems by the above methods, I was able to investigate and write reports on a number of varied subjects. These included the effects on morale of the teaching of Judo (the most modern form of ju-jitsu), which was spread by a Q.M.S. in the R.A.M.C., and was found to have quite remarkable effects in inculcating a fighting spirit into the men who took part in the courses : the danger of staleness in the Division at the end of 1943, when our expected operation was cancelled, and when the possible deleterious effects of another prolonged period of concentrated training presented themselves : another report was written on some of the factors concerned in the contraction of venereal disease, though unfortunately I did not have the opportunity to do more than a small-scale investigation into this subject.

During battle, reports were written on the occurrence of psychiatric battle casualties, and where it was relevant particular reference was made to the relation between an increase in the number of cases occurring and current problems of morale, both local and general.

Finally, during the period between the two Campaigns, as a result of the co-operation I received, I was able to carry out a very thorough full-scale investigation of the attitude of the troops towards the problems of repatriation and demobilization.

(c) *The Spreading of Knowledge of Forward Psychiatry among Medical Officers.*—The spreading of a knowledge of the importance of selection work was achieved by means of personal contacts and conversations. R.M.O.s and Field Ambulance officers were extremely co-operative over this subject,

but, as has already been stated, it was the combatant officers who showed the greatest interest in this particular aspect of psychiatric work. However, it was possible for Medical Officers to be on the look-out for, and to refer to me if necessary, cases of psychiatric illness or any soldiers who frequently reported on sick parade without organic foundation for their complaints.

A short time after I joined the Division I compiled a full report dealing with the ætiology, recognition, and early treatment of psychiatric battle casualties; this was based on reports that I had read describing the experiences of psychiatrists in forward areas in North Africa, and I also learned a number of useful practical points from Medical Officers who had been in action in the Arakan Campaign of 1943 and elsewhere. A copy of this report was sent to every R.M.O. in the Division, and to each Field Ambulance.

It is scarcely necessary to add that, if such knowledge can also be disseminated amongst combatant officers in a reasonably elementary and easily assimilable form, it can be of great general interest and value. I was, in fact, enabled to give lectures to officers, followed by a general discussion of the subject, in quite a few Units.

(d) *Practical Preparation for Battle.*—It is almost impossible to make preparations adequate to cover every contingency that will arise in practice, and, whatever one has tried to foresee, some sort of improvisation will probably be necessary when the time comes to function in battle.

It should be remembered that, as a Divisional psychiatrist, I was only attached to Divisional H.Q. I was not provided with a clerk, with trained medical orderlies of my own, with transport or, for a time at any rate, with medical equipment on any official basis. Soon after joining the Division, two psychiatric panniers, as officially laid down by G.H.Q.(I), did arrive, but these were soon afterwards taken away and given to 36th Division who went into action before us, so that I arrived at Kohima in the possession of no medical equipment at all. I will mention later what equipment I did accumulate, and what items I consider as a result of my experience to be indispensable.

However, it seemed to me when I joined the Division that certain essential foundations could be laid in preparation for battle.

In the first place, it did seem to me to be absolutely essential that I should be able to call upon orderlies in each Field Ambulance to assist with the nursing and treatment of psychiatric casualties in battle. I therefore suggested to the A.D.M.S. that it might be profitable to hold a short course for selected orderlies, with representatives from each Field Ambulance to attend. He readily agreed to this, and a course was given to six R.A.M.C. men, each Field Ambulance providing two. Three of these had had mental nursing experience in civil life but, when the time came, it turned out in practice that the men without such experience proved rather better than those with it, and I am sure that any intelligent orderly who is interested, and has a natural aptitude for dealing with human beings, can easily be trained to do everything that will be required of him.

The course that I held was on a fairly broad basis with an introduction to the general principles of psychiatry: it touched briefly on the elements of

peacetime mental disease, including mental deficiency, the psychoses and psychoneuroses, and went on to describe in fuller detail wartime battle casualties, their treatment, the use of drugs, and their dosage. Unfortunately, little was possible in the way of practical demonstrations, though I was able to take them to No. 3 I.B.G.H.(B.T.) to the psychiatric department and show them a few cases of interest.

The assistance of these orderlies later proved to be of great value.

Secondly, it was necessary to provide R.M.O.s and Field Ambulances with adequate supplies of sedative drugs. A bulk indent was made out, and supplies of soluble barbitone, potassium bromide, and pentothal sodium were distributed.

Thirdly, it was obvious that I would require transport, and just before we set off for Kohima the A.D.M.S. was able to procure a 15-cwt. Dodge for my own use.

Lastly, just before going into action a brief circular letter was sent to R.M.O.s and Field Ambulances on the subject of psychiatric battle casualties, which laid down that the initial diagnosis on the Field Medical Card should in every case be "Exhaustion."

IV.—THE FUNCTIONS OF THE DIVISIONAL PSYCHIATRIST IN BATTLE.

The three important functions of the Divisional Psychiatrist in battle are :—

- (a) *Treatment of Psychiatric Battle Casualties.*
- (b) *Disposal of Psychiatric Battle Casualties.*
- (c) *Assessment of Morale, Both General and Local.*

It is necessary to make a few introductory remarks before going on to deal with these subheadings separately.

How these three functions may best be accomplished will depend upon the actual battle conditions, the tactical situation and numerous other such factors. I will deal with this subject mainly in narrative form, so that at any rate some of the problems that may arise will become apparent.

In the Division's first Campaign (at Kohima) I first of all tried to hold and treat my cases at a M.D.S. The battle, as I have already stated earlier, was relatively static for some weeks; the M.D.S.s were set up a few miles behind the front line, and in the early stages of the battle were in very close proximity to our own Artillery Regiments. A very heavy barrage was being put down, the noise at the M.D.S. was intense, and any attempts at sedation were futile, for under these conditions maximal doses of sedatives induced little or no sleep, whilst the patients' anxiety constantly mounted. In addition to this it soon became evident that, in view of the numbers of psychiatric cases that would be likely to occur in this type of battle, and having regard to the time required to treat them adequately, the accommodation available at the M.D.S. would soon prove to be insufficient.

It was obviously undesirable to treat these cases as far back from the front line as Dimapur, and therefore, with the assistance of D.D.M.S., 33 Corps, and my A.D.M.S., it was decided that a Rest Centre should be established at the 28th Milestone on the Dimapur-Kohima road, about 16 miles

from the front-line. At first it was difficult to commandeer suitable buildings, but after a few days a R.E. Major stationed there was able, by the use of local labour, to convert a large tin shed which had been occupied by locals and their goats into two clean, white-washed, and very presentable wards. In addition to this I set up three 40 lb. tents, each containing 2 stretchers. Thirty beds with sheets and blankets were obtained for the wards, and we were thus soon able to accommodate 36 patients at a time, and to deal with the rush of cases that did occur very soon afterwards.

A cookhouse, recreation room, latrines and an ablution room with hot baths were built, and the necessary stores, medical equipment and amenities were rapidly obtained from various sources, so that very soon we had accumulated everything necessary, including supplies of new battle dresses, underwear, boots, shaving kit, a wireless set, gramophone and records and a supply of books and periodicals.

My staff consisted of three medical orderlies, one from each Field Ambulance, who had received previous training on the course that I have mentioned. A recovered patient was retained as cook.

This lay-out proved extremely satisfactory for the treatment of psychiatric cases, and I have stressed it because it must be borne in mind that everything was improvised, and that the whole arrangement would have been quite impracticable but for the unfailing assistance that was given me by my D.D.M.S. and A.D.M.S., and a not inconsiderable wastage of manpower might have occurred.

My one serious difficulty in this campaign was that I did not have a Corps psychiatrist working behind me. Those cases that I had to evacuate were sent to the I.G.H. at Dimapur for evacuation to the Psychiatric Centre at 47 B.G.H. at Calcutta. Evacuation was slow, they received little or no special treatment or supervision *en route*, and were thus obviously deteriorating the whole time in many cases.

In the Division's second campaign the problems that arose were quite different, and from my point of view the position was much simpler than it had been at Kohima.

The nature of this campaign has already been indicated. The Field Ambulances "leap-frogged" each other and from the Chindwin to the Irrawaddy were seldom receiving patients for more than a few days before they began to close down and transfer their patients to the next M.D.S. that had passed through. Later the tempo of the advance slowed down and the moves were less frequent.

Accommodation at the M.D.S.s was much more extensive than at Kohima, for the A.D.M.S. had laid it down that as many cases as possible should be retained and treated at the M.D.S.s to avoid the evacuation of large numbers of patients, with the loss of man-power involved: at times the M.D.S.s were holding up to 150 or even 200 patients. In addition to this the M.D.S.s were seldom in range of Jap Artillery or located close to our own Gunners; psychiatric casualties were, apart from one period, less concentrated than at Kohima, so that it was found possible and satisfactory for me to function at

M.D.S. level, and I thus did not have to deal with the various administrative problems that presented themselves whilst I was running my hospital at Kohima.

In the campaign, also, the 33 Corps Psychiatric Centre was functioning behind me, and it was always possible for me to evacuate by air (which was the method of evacuation for all patients in this campaign) any patients that I could not retain.

At this stage it is worth considering the advisability of trying to treat psychiatric casualties in a centre which is likely to come under enemy fire. Although obviously these conditions are almost certain to occur at some time or another in battle, I am convinced that it is quite impracticable to treat these cases satisfactorily under these circumstances.

It is possible to argue that, if they do come under fire, this can be regarded as a "test case" for them, and that if they panic under these conditions it is obviously waste of time to send them back to their Unit. As against this, however, I would say in the first place that these men are temporarily demoralized, and that their first and essential requirements at this stage are sleep, food and rest under quiet conditions in order that they may later regain their confidence and reorientate their ideas to rejoining their Unit and again coming under fire. In the second place, if these men are subjected to shelling or other enemy action whilst under treatment, there are certain to be some who will panic and infect the others who may be on the road to a good recovery.

A collection of psychiatric casualties is a group of demoralized soldiers, and those men who return to their Unit will be sustained and fortified more than anything else by their comrades' steadiness, by their pride in their Unit, and by all the other incalculable factors that weld Units together, and keep going troops who know and trust their leaders and each other, in the din of battle.

From personal experience of only mild shelling of the M.D.S. I can state that the effect on psychiatric patients, both individually and as a group, is thoroughly harmful. Under these circumstances it is, of course, absolutely essential that slit trenches should have been dug by the patients themselves, as this does give them in some degree a sense of security.

It is now time to consider the functions of the psychiatrist in battle under the original subheadings.

(a) *Treatment of Psychiatric Battle Casualties.*—A great deal of literature has been written on this subject, and I will try as best I can to avoid the reiteration of facts and points of view that are now generally known and accepted.

I will first deal with the types of reaction that I met with during the two campaigns and the relative frequency with which these types of reaction occurred, avoiding a detailed description of the clinical features of these cases, which has been very adequately covered in other reports.

I had been struck before Kohima, when reading reports from North Africa, by the very high percentage of cases that in some campaigns had received a final diagnosis from specialists in psychiatry of "Physical Exhaustion":

one report, I think, put this figure as high as 80 per cent of total psychiatric casualties.

Probably as a result of this, I found myself at first at Kohima making this diagnosis rather frequently. In fact, physical exhaustion as a factor was present in varying degrees in almost every case where Infantrymen were concerned. Large numbers of men came in unshaven and unwashed, red-eyed, covered in dust or mud from head to foot, scarcely able to keep their eyes open, but with little or no apparent evidence of other psychiatric disorder. It is easy enough to fall into the error of labelling such cases "Physical Exhaustion" when one has a rush of casualties and inadequate opportunity for taking more than a brief and superficial history. But the question arises as to why this particular man had to be evacuated from the battlefield, and closer questioning almost always revealed that, in fact, he had either succumbed to an acute anxiety state or had collapsed on the march (hysterical reaction superimposed on exhaustion): after all there were all the other men equally as exhausted, who were yet able to carry on.

On this basis of assessment, taking all the cases that I saw in the two campaigns, the following was the approximate relative number of reaction types that occurred :—

Acute anxiety state	80 per cent
Hysteria	10 per cent
Physical exhaustion	6 per cent
N.Y.D.	3 per cent
Reactive Depression	1 per cent

N.Y.D. as a diagnosis comprises cases that presented in the initial stages psychotic features and who had to be evacuated for further observation and treatment.

A very low proportion indeed of officer casualties occurred during the two campaigns, and those that did occur were all acute anxiety states.

With regard to the actual treatment of psychiatric battle casualties it is possibly worth while to deal with this subject in some detail, because, so far as I know, there has not yet been a great deal written from the point of view of what can be done actually at Divisional level, where a number of factors put a limitation on the type, extent, and duration of treatment which is feasible.

The subject may be treated under the following subheadings :—

- (1) Treatment by R.M.O. and Labelling of Casualties.
- (2) General Principles of Treatment by the Psychiatrist.
- (3) Drugs.
- (4) Results of Treatment.
- (5) Relapses.

(1) Treatment by R.M.O. and Labelling of Casualties : It is essential that every Medical Officer in a Division should have a sound working knowledge of the recognition and treatment of psychiatric cases in battle, for a great deal depends upon his ability to handle them correctly. A good R.M.O., who really knows his officers and men, can do an enormous amount of good towards

sustaining the morale of his Unit by his ability to judge of the right disposal of these cases. Retention of severe cases in a forward area, or, on the other hand, indiscriminate evacuation of mild cases are both highly deleterious to Unit morale.

In general, the R.M.O.s in 2nd Division were of a very high standard, and did really excellent work in this direction : a good deal of prophylactic treatment was given on their own initiative, and they were often able to give men a day or so of rest at their unit " B Echelon," with sedatives at night, and to get them back into the line without having to evacuate them to Field Ambulance level.

I have already mentioned that R.M.O.s were provided with supplies of pentothal and soluble barbitone, and these were found to be convenient and adequate for most purposes. Hyperacute anxiety states were, whenever possible, given an intravenous injection of pentothal, and these cases were often asleep or very dozey when they reached me, but obviously the prior claims of lying wounded always had to be considered, and the majority of severe breakdowns were evacuated of necessity as walking cases, after receiving soluble barbitone, gr. xv. This, admittedly, usually had very little obvious effect, but did at least indicate to the patient that something was being done for him, and presumably must have helped to damp down really acute and intolerable anxiety to some degree.

All cases were labelled " Exhaustion " by the R.M.O. on the Field Medical Card, and the M.O. was requested, wherever possible, to write a brief note on the patient's previous personality and his record as a soldier, and to indicate what sedatives had been given, and at what time. Where casualties of all types were heavy this was not always possible, but the method did work reasonably satisfactorily. The use of A.F. B183 in battle is, of course, almost always impracticable.

I consider that the procedure of labelling all cases " Exhaustion " did justify itself. Although, naturally enough, many of the troops soon tumbled to the fact that the term was synonymous with what they had always thought of as " shell-shock," it was apparent to me that not a few of them did accept the term at its face value, and did regard their condition from the beginning with an optimism and a will to recovery that would, I think, have been rapidly dispelled if they had been allowed to regard themselves as " shell-shocked."

(2) General Principles of Treatment by the Psychiatrist : Before dealing with general methods of treatment, it will be profitable to try and feel our way into the thoughts and emotions of the man who has broken down under battle conditions. The following description presupposes that the casualty is a man of reasonably adequate personality, endowed with at any rate a fair degree of courage, self-esteem, and pride of Unit (and if selection work has been thorough and Unit morale is high, a good proportion of cases should correspond to this type). Dullards, and cases of chronic psychoneurosis, other than mild ones, present, of course, a bad immediate prognosis, and cannot be grouped with the types that I have mentioned above.

The psychiatric battle casualty then, will be physically tired : usually he

has been short of sleep for many consecutive nights, and often short of food. He will often be dirty, unkempt, and unshaven, and his clothing and person will frequently be thick with mud or dust, his clothing often torn, and frequently he will have a number of superficial excoriations of the skin which may have become infected. Amidst a welter of different emotions he will be subject predominantly to feelings of acute anxiety and of exhaustion, of shame at having broken down, of relief at being out of the fighting, of depression and irritability, of hatred for and at the same time fear of the enemy, and so on. But the uppermost factor in his mind must be that he has—temporarily at any rate—failed in his duty as a soldier, whether he openly accuses himself of behaving in a cowardly manner as not infrequently occurs, or whether he seeks partially to excuse his conduct: he has fallen out of his group of which he was a part, and is now separated from it and has to face alone an overwhelming flood of painful emotions.

How can we try and help such a man back to mental health in a few days, in order to enable him to continue fighting in the front line?

It is obvious that to produce rapid results the soldier must feel that right from the beginning something positive is being done for him: hence the importance of the initial handling by the R.M.O.; at the Rest Centre the two most important factors are, first, the general lay-out and atmosphere of the Centre itself and secondly, the mental attitude towards him of the human beings with whom he comes into contact there.

The Rest Centre, then, must be able to provide at once for all his immediate needs. Hence the extreme importance of an organization which can provide for the patient a hot meal, a long uninterrupted sleep, and later on a bath, change of clothing, and a razor (he has often lost his own shaving kit). It is also important, from the psychological point of view, that any minor organic disabilities should receive immediate attention, that skin lesions should be dressed, and so on. In fact, in the early stages, his need for personal comfort and emotional security should be the first consideration, and to anyone who has not seen such cases in a forward area it would, I think, be surprising to note the change in many patients merely after the administration of these very elementary lines of treatment. In most cases all that is required of the psychiatrist in these initial stages is that he should give the man an initial interview, reassurance, tempered with as much optimism as the patient's condition at the time warrants, and a physical examination.

The second consideration is the mental attitude adopted towards the patient by the psychiatrist and his medical orderlies throughout the period of his stay at the Rest Centre. The orderlies need to have a high degree of common sense, and to be able to combine a sufficient degree of tact and sympathy with the right amount of firmness when it is required: they must be real exponents of the "Iron hand in the velvet glove." It is a *sine qua non* that they should be interested in the work, and, if they are, they can be of inestimable value in their handling of the patients, by chatting with them about the battle, their Units, etc., and by discussing with them their superficial difficulties.

How much can the psychiatrist do at Divisional level in the way of active treatment by personal interviews with his patients? As it is scarcely ever feasible to retain patients for more than five days it is obvious that little beyond the most superficial therapy is possible, and with a few exceptions treatment must necessarily be restricted to simple explanation, reassurance, and encouragement.

In a formation in which morale and pride of Unit stand high it is profitable and, I consider, absolutely justifiable to play on these aspects in treatment, and to use them as levers with which to boost up the patient's natural recuperative powers. I do not think that it is possible, or indeed desirable, to carry out any deeper form of treatment than this at Divisional level, and the results obtained by these methods did prove to be satisfactory.

It goes without saying that all cases who have a bad immediate prognosis should be evacuated further back as rapidly as possible, as their effects on the cases with a better prognosis is not good.

Group treatment was not attempted, but obviously has considerable possibilities at this level.

Abreaction under pentothal as a method of treatment I used only very occasionally—usually in cases of gross hysteria. Even so, I think that such patients should be evacuated straight back and dealt with more fully at another Centre to ensure continuity of treatment.

During the stage of rehabilitation it is essential that any outstanding personal or domestic worries should be investigated, and the patients must be enabled to write letters home as soon as they wish, whilst visits from Unit Padres are always of value. The importance of providing the men with some occupation at this stage goes without saying.

(3) *Drugs : Pentothal Sodium* : I have mentioned that this drug was used in cases of gross hysteria, i.e. amnesia, mutism, hysterical deafness and blindness, and so on.

It was also found valuable in controlling temporarily hyperacute states of anxiety or in inducing immediate unconsciousness in men who presented an apparently psychotic episode.

0.3 to 0.5 gramme was the usual dosage employed. In general, however, little use was made of this drug.

Paraldehyde : I found this to be the ideal sedative for the rapid induction of sleep in acute anxiety states and used it finally almost to the exclusion of anything else.

It is extremely rapid and sure in its effects and almost always induces sleep within fifteen minutes : it has the additional advantage of leaving no "hang-over" or after-effects and, more than any other drug that I employed, produces sleep that approximates to the natural.

Three or four drachms were usually given for severe cases, and very occasionally an additional drachm or two was found necessary after another hour or so, but this was quite exceptional. In cases of Pure Physical Exhaustion one or two drachms were adequate.

The obnoxious smell and taste of this drug are, of course, a disadvantage

and occasionally its administration was followed by vomiting, but it was striking how rarely this did occur, and how very few men failed to take it readily if they were encouraged firmly and told to drink it down in one draught. In some cases one got the impression that the patients were so overwhelmed by their anxiety that the taste of the paraldehyde was scarcely noticed.

It can be made slightly less unpleasant by presenting it mixed with raw or cordial lime juice, and following its administration by giving the patient an acid-drop to suck.

It was given in either of the following mixtures (or equivalent proportions of the components) :—

Paraldehyde	..	..	..	4 drachms
Raw lime juice	..	..	..	2 ounces
Water	..	..	..	1 ounce
Paraldehyde	..	..	..	4 drachms
Lime juice cordial	..	..	..	2 ounces

These mixtures should be stirred well before they are given.

Soluble Barbitone (Medinal): This drug produced most disappointing results, except in cases where anxiety was not a pronounced factor, and it was found useful in states of pure physical exhaustion, where grains $7\frac{1}{2}$ were found adequate. In patients, however, who presented states of moderate or severe anxiety grains $22\frac{1}{2}$ of this drug frequently failed to induce sleep, and if sleep was finally induced, this amount of sedative often took an hour or more to work, and left a "hang-over" afterwards.

I also tried *Phenobarbitone* (Luminal) for a short time but found it no better than Soluble Barbitone.

In addition to sedative drugs the Rest Centre should always have available adequate supplies of iodine, acriflavine, lin. meth. sal., lint, cotton-wool and bandages, and a few simple mixtures such as mist. bismuth & soda, mist. expect. stim., etc., for the treatment of the minor physical disabilities to which these patients are often subject.

(4) Results of Treatment: The results obtained in treating psychiatric battle casualties will depend more than anything else on the amount of selection work that has been done prior to battle, on the standards of officer leadership, and on the morale of the troops in general. Cases will always occur, however thorough the combing out has attempted to be, who should never have been sent into battle, and who, it can be seen at once, have a hopeless prognosis as regards return to their Unit.

The results that I obtained at Kohima were satisfactory for the reasons that selection work had been thorough, morale throughout the Division was very high indeed, and because I had an ideal Rest Centre in which to work.

The disposal figures were :—

R.T.U.	..	..	..	115
Evacuated	..	..	..	29
L.O.B.	..	..	..	37

Total 181

L.O.B. (left out of battle) indicates patients who recovered sufficiently to be able adequately to perform a job within the Division in a rear area.

Thus it was possible to return 63·7 per cent of the patients to their parent Unit, whilst only 16 per cent of them had to be evacuated to hospital for further treatment.

In the Division's second campaign the disposal figures were :—

R.T.U.	..	..	..	72
Evacuated	..	..	..	62
L.O.B.	..	..	..	30

Total 164

This gives a percentage of 43·3 R.T.U., and 32·9 evacuated to hospital.

The lower percentage of R.T.U. cases is to be attributed to the many and various factors that caused morale to be less high than at Kohima, and the general quality of the patients to be rather less satisfactory. The high percentage of cases evacuated is misleading, because it must be remembered that in this campaign I always had the 33 Corps Psychiatric Centre behind me, and used this freely at times when I was unable to hold patients owing to sudden moves, and so on. In fact, a fair proportion of cases were R.T.U. from the Corps Centre.

(5) Relapses : The number of cases who had been returned to duty to their parent Unit who again broke down and had to be evacuated a second time during battle, was in the neighbourhood of 10 per cent in both campaigns. The breakdowns were not often completely incapacitating, and in almost every case it was possible for the patient to perform L.O.B. duties adequately.

A follow-up of cases after the campaigns were over showed that approximately another 6 or 7 per cent of these cases were unfit to face further battle stress, and required either to be recategorized or, in a few cases, to be admitted to hospital for treatment.

I think that at this stage a few remarks as to the prognosis with regard to the actual performance of the men who were returned to their Units and did not relapse, will not be out of place. I think it is high time that a definite statement on this subject was made.

It is an obvious fact that, in any Unit, quite apart from men who are manifestly unsuitable for battle conditions and should have been excluded by selection work previously, there will be an admixture of good, moderate, and indifferent soldiers, and it cannot be denied that psychiatric battle casualties are drawn in the main from the two latter groups. I consider the breakdown in battle of a really good soldier who comes from a Unit where morale is high to be a very rare occurrence. I would quote as an example the 1st Bn. Queen's Own Cameron Highlanders, from which Unit a minimal number of psychiatric cases occurred in both the 2nd Division's campaigns. The spirit of the men in this Battalion was typified by one soldier who during the crossing of the Irrawaddy sustained a severe fracture of the femur : he was carried several miles down stream, was in the water for many hours, and was finally brought to the M.D.S. more than twenty-four hours after his wound

occurred. Even as late as that he was found to be in perfect physical condition, and was quite unperturbed and very cheerful. I maintain that it is quite exceptional for men of this calibre to break down in battle: they form the group of those who are in the forefront of every attack and remain steady under almost any circumstances, but there remains the group of soldiers who, though they carry on adequately, will always tend to hang back. They perform their duties within the letter of the law, but do not display the dash and zeal of the really first-class soldier.

I think it is well to remember, then, that psychiatric battle cases are drawn mainly from this latter group. Some reports that I have read did seem to me to be couched in rather too optimistic terms and to give the impression that numbers of these cases return to their Units to perform miracles of valour in the field, or that many of them before breaking down had already distinguished themselves by their gallantry. Pleasing though this picture is, I am convinced that it is quite untrue, and that we have to accept the fact that in most cases these men are not *really* good soldiers. There are a few—but very few—exceptions to this, and amongst the cases I treated there were occasionally men who later received awards for gallantry.

Nevertheless, the Divisional psychiatrist can at least do a valuable job of work in battle by enabling a good proportion of his cases to carry on and perform adequately their original duties.

We must now deal with the second important function of the Divisional psychiatrist in battle, viz. :—

(b) *Disposal of Psychiatric Battle Casualties.*—During the Kohima battle, the arrangements for disposal of these cases were not very satisfactory. Men who were fit to return to their parent Unit presented no difficulty, and were sent back to their R.M.O. with a report on their condition, but, as has already been stated, the disposal of cases that required further hospital treatment was unsatisfactory owing to the absence of any treatment centre to which I could evacuate them. The disposal of the L.O.B. cases, too, was not well organized, because I was separated from and had no real liaison with the “A” Branch at Divisional Headquarters. The best that could be done was to send them back to Divisional “Rear Details” at Dimapur, where it was usually possible to find some sort of employment for them.

During our second campaign, however, I was never far from Divisional Headquarters, and kept in constant touch with the D.A.A.G., who early in the campaign implemented a valuable scheme, which covered every contingency, and a directive was issued to all Units on the subject.

Psychiatric casualties who were able to return to their Unit and those who required evacuation to hospital from my Centre, presented no difficulty (the latter were transferred to the Corps Centre). All L.O.B. cases were given employment within the Division in a rear area, and in the majority of cases it was possible to fit them into employment where they were of value to the Division and where their abilities could best be made use of. Thus, on my recommendation, it was possible for these men to be fixed up as batmen at Div. H.Q., to be temporarily attached to R.E.M.E., R.A.S.C., Div. Staging Camp., Div.

Maintenance Company, and so on. Arrangements were made with the A.D.M.S. to have all these men boarded and placed in their correct medical category before they were attached to their new Unit.

By this method it was possible to achieve in a small way an economy in man-power.

(c) *Assessment of Morale, Both Local and General.*—It is of the utmost importance that the Divisional psychiatrist should, during battle, be able to assess accurately all the variable factors that influence morale, and to give his views on the subject when required by the Divisional Commander or A.D.M.S. Hence the importance of knowing the general background of the troops really well and the advantage of having served with them for a long period.

It is generally accepted that the number of psychiatric battle casualties, relative to total casualties, that occur, gives a fairly accurate index of morale. It has already been mentioned that a proportionately far higher number of cases (17.6 per cent as against 9.7 per cent) occurred in the Division's second campaign than at Kohima. A number of reasons for this stand out, the most important of which are staleness; "repatriation-consciousness" (the Division had been just over three years overseas when it was flown out of Burma); increased subjection to shelling—there was much more Japanese Artillery opposing us than at Kohima; a lower malaria rate, due to a tightening up of mepacrine discipline; the presence of reinforcements in large numbers who were not of the highest standard, and so on. Throughout this second campaign a close watch was kept on the number of cases occurring, and any sudden increase in the figures was immediately reported.

Equally interesting and important was the very wide variation in the numbers of cases from Unit to Unit in both the Division's campaigns. Selection work throughout the Division had been equally intensive from Unit to Unit, yet at Kohima one Battalion sustained 23 per cent psychiatric casualties, whilst the corresponding figure from another was 1.6 per cent. The reason for this was that the former Battalion was commanded by an officer who was unpopular throughout the Unit, and who had failed to win the respect of his subordinates either as a tactician or as a man before battle, and during battle he failed in both roles, with the result that numbers of men broke down who should never have done so; it was not so much a matter of individual breakdowns as of a wholesale loss of group morale with numbers of anxious men turning back bewildered with feelings of helpless apathy, mixed with disgust at the lack of proper leadership.

In and out of battle there is no doubt that the Commanding Officer is the focal point of Unit morale, and that his personality and character make themselves felt throughout the whole Unit.

In another Battalion at Kohima, in which the Commanding Officer was a much-respected and almost Olympian figure, one had the situation of numbers of men with fairly severe clinical dysentery refusing to report sick before a particularly hazardous attack.

Apart from the Commanding Officer, the personality of the R.M.O. and

Padre are very important, and their behaviour during battle may have very marked effects on Unit morale in general.

No less important, of course, from the local point of view is the question of leadership in Company and Platoon Commanders. In fact, very few officer breakdowns occurred in either campaign, but the breakdown of one Platoon Commander at Kohima caused the best part of his platoon to be evacuated as psychiatric cases after an attack that was met by unexpected and withering opposition.

Although it is common knowledge, it cannot be emphasized too much that bad leadership has disastrous effects on the men concerned ; individually there was probably little to choose between the men in the Battalions that I have mentioned, and time and time again I was struck by the fact that a Battalion which contains good officers and N.C.O.s, and in which morale and pride of Regiment are high, can "carry" successfully men of moderate or indifferent quality.

These remarks are no criticism of the value of selection work : there will always remain the dullards, psychopaths, and chronic psychoneurotics who are incapable, by reason of their constitution, of developing the sentiments of loyalty to the group that are essential to the make-up of a good soldier. These men will never make efficient front-line soldiers, even under the best local conditions.

V.—SUMMARY AND CONCLUSIONS.

By giving a fairly full account of my activities with the British Second Division, I hope it has been possible to indicate that in wartime there are opportunities for a Divisional psychiatrist to do work of value over a number of different fields. All that remains now is to make a criticism of the status of the psychiatrist in his capacity of an officer attached to Divisional Headquarters, and to put forward tentative suggestions on this subject.

I have already mentioned, but it is quite impossible to stress sufficiently, the very high degree of assistance and encouragement which I received at all stages of my work from the Divisional Commanders and A.D.s.M.S. under whom I served. It was this unfailing help that, again and again, enabled me to function efficiently and to improvise in times of need. In circumstances where this full co-operation is not forthcoming, the position of the Divisional Psychiatrist could be extremely difficult, and it is for this reason that I consider that there is a strong argument that he should be posted to a Division with the status of a Staff Officer, recognized on the establishment of a Divisional Headquarters, and officially provided with the medical equipment, transport, and staff which he requires if he is to do full justice to his job.

*Clinical and Other Notes.***AN IMPROVISED STRETCHER BED
WITH ATTACHMENTS.**

BY

Lieutenant-Colonel M. S. HOLMAN,
Royal Army Medical Corps.

[Received May 8, 1946.]

STRETCHERS are very convenient as beds for mobile units but have the disadvantage of being without legs and Units find it necessary to improvise some means of raising them above the ground and have to do so afresh at each successive station.



Improved stretcher bed with attachments ("Holman") as used in the Burma Campaign.

As the methods used are usually cumbersome and involve a considerable amount of labour, a simple means of making a permanent stretcher bed was devised as shown in fig. 1. This has been in use in ALFSEA Units for over a year and has contributed considerably to the comfort of the patients.

In addition to legs, a small side-table about 1 ft. square was fitted and a cloth sling for small kit attached to the head-end stretcher handles.

The legs and attachments are easily removable and are shown in the figure.

Conversion can be carried out in forward areas and the material required is readily available. The details are as follows :—

Conversion of standard stretcher :—

- (1) 13/32 hole drilled into each runner.
- (2) Shallow hole drilled into wood above.
- (3) Two pieces of $\frac{3}{8}$ in. iron rod each 4 ft. 2½ in. in length are bent into two slightly closed U's. The vertical arms of each are 1 ft. 2 in. in length and are passed through the drilled holes into the wood above.
- (4) The U legs so formed support the stretcher. These legs can be readily detached so preserving the convenience of the stretcher for mobile use.
- (5) Two tinplate brackets are nailed to the stretcher for the side table.

Attachments.—Stretcher kit sling. This consists of a canvas sling between the two upper stretcher handles.

Side-Table.—This is about 1 square foot in area, and is attached near the left head end of the stretcher.

Private De Coene, R.A.M.C., was partially responsible for its design.

THE USE OF D.D.T. FOR DOMESTIC PURPOSES.

BY

Captain L. J. HARRISON,
Royal Army Medical Corps,
(Officer Commanding 38, 39, and 44 I.F.H.S.)

[Received April 15, 1946.]

THE discovery and perfection of D.D.T. for use during the war has undoubtedly proved its worth, but there is yet much to learn of the actual powers of D.D.T.

On arrival in Singapore just after the re-occupation, the duties of my Field Hygiene Section were confined to the Hygiene of all R.A.P.W.I. camps on the Island.

The usual mosquito, fly and other insect pests were dealt with by various forms of D.D.T. emulsion, spray and powder, with the success to which we have become accustomed.

During the course of my duties, when I later took over the Hygiene of military units on the Island, there was the ever constant menace of ants and cockroaches in bungalows and offices, the former appearing very rapidly when scraps of food, chocolate or sugar were left on tables, window ledges and floors. Even used empty beer and mineral water glasses attracted these little pests in very short time.

Nothing short of constant spraying or use of powder could prevent them, and this was not practicable, possible or economical. I therefore carried out the following experiments :—

Four pounds of an ordinary, popular brand of floor polish were obtained. Two pounds of this polish were mixed very thoroughly with sufficient D.D.T. powder to give a 5 per cent concentrate. The other two pounds of polish were unadulterated.

Selected rooms, tables and window ledges were then taken, where ants were prevalent, and a controlled system of polishing was adopted. Half a floor space, table or window ledge was polished with the impregnated polish, and the other half with ordinary polish. On each floor or article, a small amount of chocolate and sugar was left around.

In other cases, scraps of food and used beer and mineral water glasses were also left about, being changed daily to ensure perfect attraction to ants.

The results, after fourteen days' trial were, I think, conclusive. The impregnated polished surfaces remained free from insects of all kind, and the chocolate, sugar, food and glasses untouched for this period without repolishing.

The ordinary polished surfaces were as usual infested with ants in a very short while.

It is assumed that the normal housewife adds polish on the average every ten days and, under these circumstances, I feel the incorporation of 5 per cent D.D.T. to any domestic floor polish will prove a great boon to housewives generally; particularly those living in tropical countries, where these pests are more prevalent. At home I feel it may also prove of great value, in prevention of pest trouble, plus, I am sure, the preservation of woodwork against woodlice, etc.

Review.

A POCKET MEDICAL DICTIONARY. Seventh edition. Compiled by Lois Oakes, S.R.N., D.N. (London and Leeds), assisted by Thos. B. Davie, B.A., M.D. (Liverpool), F.R.C.P. (Lond.). Edinburgh: E. & S. Livingstone, Ltd. 1946. Pp. xx + 451. Price 4s. net.

The Preface to this book begins with the remark (with which we agree) that "The demand for a Seventh Edition of this dictionary is proof of its continued popularity and usefulness."

In our copy a few of the leaves have become intermixed, which is somewhat of a blemish in a dictionary but this is probably due to an error in binding and may not occur in other copies. "Pruritis" is wrongly spelt.

ERRATUM.

In the article "The Work of a Corps Psychiatrist in the Italian Campaign," Vol. lxxxvi, No. 3, March, 1946, page 130, *for* "It is part of the job of the Army Psychiatrist to interpret for him *his* attitudes and trends of thought which may affect the morale and fighting efficiency of his men," *read* "It is part of the job of the Army Psychiatrist to interpret for him *those* attitudes and trends of thought which may affect the morale and fighting efficiency of his men."

Vitamins in Dermatology

New methods of treatment, using certain of the vitamins in high doses, are proving of great value in skin diseases. One example is the successful substitution of calciferol for the usual forms of ultraviolet light. Another is the use of riboflavin for seborrhœic dermatitis and rosacea keratitis. The uses of Vitamin A are already well known.

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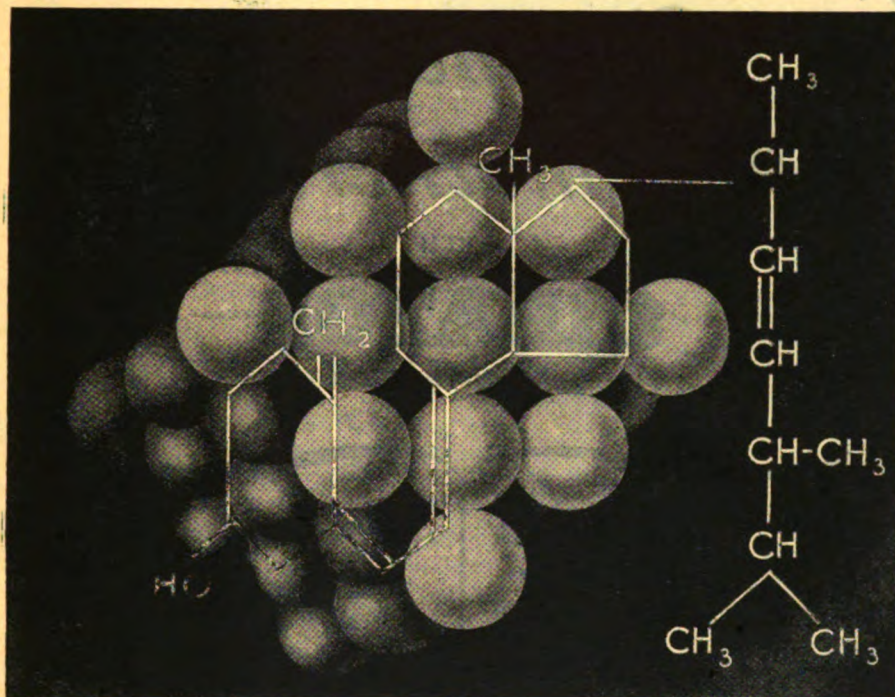


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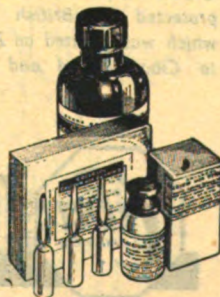
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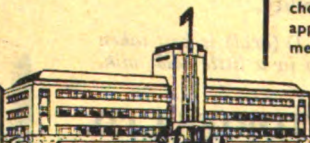
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 Murray, Capt. A. F.
 Parker, Capt. G. F. R.
 Pollock, Capt. R.
 Randall, Capt. D. H.
 Robertson, Capt. R.
 Sanderson, Capt. R. L.
 Schrire, Capt. L.
 Simmons, Capt. C. A.
 Smith, Capt. L. F.
 Spencer, Capt. I. O. B.
 Stewart, Capt. I. McD. G.
 Thomson, Capt. A. C. P. D., *M.C.*
 Wells, Capt. C. E. C.
 Wiltshire, Capt. R. M.
 Gottlier, Lieut. J.

Sanderson, Sgt. G. McG., 2749460.
 Shiner, Sgt. L. D., 7347891
 Lees, Pte. A. B., 7362280
 Logie, Pte. W. J. P., 7348301

The Army Dental Corps.

Green, Capt. J. M.
 Hodgson, Capt. T. R.

December 28.

M.B.E.

Hunkin, Sister L. E., Q.A.I.M.N.S.R.

December 4.—Col. (Actg. Maj.-Gen.) J. Walker, *C.B.E.*, *M.C.*, M.B. (1310), late R.A.M.C., on completion of four years in the rank, is retained on the Active List supern., Nov. 28, 1945.

December 7.—Maj.-Gen. A. G. Biggam, *C.B.*, *O.B.E.*, M.D., F.R.C.P., K.H.P. (14900), late R.A.M.C., on completion of four years in the rank is retained on the Active List (supern.), Oct. 29, 1945. (Substituted for the notifi. in Gazette (Supplement) dated Oct. 30, 1945.)

Maj. A. H. Bond (1030), ret. pay, is restored to the rank of Lt.-Col. on ceasing to be re-employed Sept. 19, 1945.

War Subs. Maj. M. L. Rosenheim, M.D., F.R.C.P. (216206), to be a Consultant, and is granted the Local rank of Brig., Nov. 9, 1945.

December 11.—The undermentioned Lt.-Cols from R.A.M.C. to be Cols., Nov. 28, 1945, with seniority as shown :—

T. Young, M.B. (10380), May 17, 1944.

W. Russell, *M.C.*, M.B. (15662), July 26, 1944.

G. S. Douglas (15706), Aug. 1, 1944.

E. S. Cuthbert (15375), May 22, 1944.

Maj.-Gen. R. E. Barnsley, *C.B.*, *M.C.*, M.B. K.H.S. (15324), late R.A.M.C., on completion of four years in the rank, is retained on the Active List (supern.), Nov. 28, 1945.

Col. (temp. Maj.-Gen.) J. C. A. Dowse, *C.B.E.*, *M.C.*, M.B. (8626), late R.A.M.C., is restored to establishment, Nov. 28, 1945.

Col. (temp. Maj.-Gen.) J. C. A. Dowse (8626), late R.A.M.C., to be Maj.-Gen., Nov. 28, 1945.

The undermentioned to be Lt.-Cols. Nov. 28, 1945 :—

Maj. C. L. Day, M.B. (39805)

Maj. D. C. McC. Ettles, M.B., F.R.C.S. (40495)

Maj. S. M. Burrows (38891)

Maj. (War Subs. Lt.-Col.) J. C. Gilroy (39087)

Maj. P. J. L. Capon (39084)

December 14.—Col. (actg. Maj.-Gen.) J. Walker, *C.B.E.*, *M.C.*, M.B. (1310), late R.A.M.C., to be temp. Maj.-Gen., Dec. 12, 1945.

Lt.-Col. W. J. Robertson, M.B. (14375), from R.A.M.C., to be Col., Nov. 28, 1945, with seniority. Sept. 30, 1944.

Maj.-Gen. D. C. Monro, *C.B.E.*, M.B., F.R.C.S. (Edin.), K.H.S. (14493), late R.A.M.C., on completion of four years in the rank, retires on ret. pay. Nov. 28, 1945.

Maj.-Gen. D. C. Monro, *C.B.E.*, M.B., F.R.C.S. (Edin.) (14493), ret. pay, late R.A.M.C., at his own request reverts to the rank of Col., Nov. 28, 1945, on being re-employed.

Maj. H. G. P. Armitage (15782) is restored to establ., Oct. 18, 1945.

December 18.—The undermentioned Lt.-Cols from R.A.M.C. to be Cols., with seniority as shown :—

Dec. 15, 1945 :—

F. R. H. Mollan, *O.B.E.*, *M.C.* (5666) Oct. 13, 1944.

Dec. 16, 1945 :—

D. Fettes, *O.B.E.*, *M.B.*, *F.R.C.S.* (Edin.) (15746) Oct. 29, 1944.

Col. H. G. Peake, *M.B.* (18354), late R.A.M.C., having attained the age for retirement, is retained on the Active List (supern.), Dec. 15, 1945.

Col. (actg. Maj.-Gen.) S. Arnott, *C.B.E.*, *D.S.O.*, *M.D.* (4215), late R.A.M.C., having attained the age for retirement, is retained on the Active List (supern.), Dec. 16, 1945.

The undermentioned Maj.s. to be Lt.-Cols. :—

Dec. 15, 1945 :—

K. McNeill, *O.B.E.*, *M.B.* (39088).

Dec. 16, 1945 :—

P. Dwyer, *M.B.* (39086).

Capt. J. Irvine (161275) is apptd. to a permanent commn., retaining his present seniority, Dec. 13, 1945.

Lt.-Col. D. Fettes (15746), R.A.M.C., to be a Consultant, and is granted the Local rank of Brig., Nov. 28, 1945.

December 21.—Lt. (Qr.-Mr.) (War Subs. Capt. (Qr.-Mr.)) C. H. W. Gray (112727) to be Capt. (Qr.-Mr.), Dec. 21, 1945.

Maj. E. Gibbon, *O.B.E.*, *M.B.* (26231), is restored to the rank of Col., Sept. 1, 1945, on ceasing to be re-employed.

December 25.—War Subs. Capt. Richard Patrick Goulden, *M.B.* (329182), from R.A.M.C. (Emerg. Commn.), is granted a short service commn. in the rank of Lt., Sept. 16, 1944, and to be Capt., Sept. 16, 1945.

January 1, 1946.—Lt.-Col. A. G. Harsant, *O.B.E.*, *M.D.*, *M.S.*, *F.R.C.S.* (5767) is restored to estab., Aug. 5, 1945.

Short Service Commns.

The undermentioned are apptd. to permanent commns. retaining their present seniority :—

Sept. 19, 1944 :—

War Subs. Maj. B. W. Hughes (102614).

Oct. 4, 1944 :—

Capt. G. W. Reid, *M.B.* (103878).

Feb. 9, 1945 :—

Capt. W. R. Lamb, *M.B.* (122729).

Apr. 20, 1945 :—

Capt. H. W. Peck (128979).

Apr. 22, 1945 :—

Capt. R. Montgomery, *M.B.* (128573).

June 17, 1945 :—

Capt. I. W. Caldwell, *M.B.* (135089).

January 4.—Maj. W. H. Scriven (30088) to be Lt.-Col., Jan. 3, 1946.

REGULAR ARMY RESERVE OF OFFICERS.

December 7.—War Subs. Lt.-Col. J. L. Ritchie, *M.B.*, *F.R.C.S.* (50571), having exceeded the age limit of liability to recall, ceases to belong to the Res. of Offrs., Sept. 25, 1945, and is granted the hon. rank of Col.

Maj. J. E. Hepper (5024) having exceeded the age limit of liability to recall, ceases to belong to the Res. of Offrs., Nov. 14, 1945, and is granted the hon. rank of Lt.-Col.

Maj. G. R. Grant, *M.C.*, *M.B.* (10957), having attained the age limit of liability to recall, ceases to belong to the Res. of Offrs., Nov. 22, 1945.

January 1, 1946.—The personal number of Capt. J. A. Cowan, *M.B.* (15755) is as now described and not as notified in Gazette (Supplement) dated Nov. 16, 1945.

Lt.-Col. J. M. Elliott, *M.B.* (1640) having exceeded the age limit of liability to recall, ceases to belong to the Res. of Offrs., Oct. 1, 1945, and is granted the hon. rank of Col.

Maj. C. J. H. Little, *O.B.E.*, *M.B.* (4821) having exceeded the age limit of liability to recall, ceases to belong to the Res. of Offrs., Oct. 27, 1945, and is granted the hon. rank of Lt.-Col.

Lt.-Col. S. D. Large, *D.S.O.*, *M.C.* (8099) having exceeded the age limit of liability to recall, ceases to belong to the Res. of Offrs., Nov. 7, 1945, and is granted the hon. rank of Col.

January 4.—Capt. C. V. Thornton, *M.C.*, *M.B.* (8103), having exceeded the age limit of liability to recall, ceases to belong to the Res. of Offrs., Oct. 9, 1945, and is granted the hon. rank of Col.

DEATHS.

COOKE.—In Teignmouth on Dec. 7, 1945, Lieutenant-Colonel Owen Cunninghame Preston Cooke. Born Dec. 12, 1879, he took the L.R.C.P. and M.R.C.S. in 1906 and entered the R.A.M.C. July 30, 1906. Promoted Captain March 7, 1910, and Major July 30, 1918, he retired with the rank of Lieutenant-Colonel Nov. 24, 1926. He subsequently held the Retired Pay appointments at Oxford and Lancaster. In the war of 1914-1918, he served in France and Egypt, being mentioned in despatches and awarded the 1914 Star and Clasp, the British War and Victory Medals.

LINDEMAN.—On Dec. 10, 1945, Colonel Sidney John Liddon Lindeman, *O.B.E.*, *M.C.* Born Nov. 4, 1892, he took the M.R.C.S. and L.R.C.P. London 1915. He served as Surgeon Probationer R.N.V.R. Oct. 20, 1914, till Jan. 5, 1915. Commissioned Temporary Lieutenant R.A.M.C. Aug. 25, 1915, and Temporary Captain Aug. 25, 1916, he was appointed to a permanent Commission April 1, 1919, and promoted Major Aug. 25, 1927. He served in H.M.S. "Woolwich" for Forrester, Harwich Striking Force, Oct. 20, 1914, till Jan. 5, 1915. He served in France March 5, 1916, till Nov. 11, 1918. Twice

mentioned in despatches, he was awarded the *M.C.*, 1914-15 Star, British War and Victory Medals. The *M.C.* was awarded for conspicuous gallantry and devotion to duty. For ten days he worked unceasingly, tending wounded under heavy fire, saving many lives. On one occasion, under intense machine gun fire, he still continued dressing and collecting wounded, and his complete disregard of danger set a fine example to those under him. He took part in the campaign in Iraq and North West Persia in 1919-1920, receiving the Medal with two Clasps. In the late war he was D.A.D.M.S. Anti-Aircraft Division, and A.D.M.S., Anti-Aircraft Command, and was awarded the *O.B.E.*

HOOPER.—In Weston-super-Mare on Dec. 23, 1945, Colonel Arthur Winsmore Hooper, *C.M.G.*, *D.S.O.*, late *R.A.M.C.*, Retired. Born in Tenby Feb. 23, 1869, he took the *M.R.C.S.* and *L.R.C.P.*, London, in 1895, and was commissioned Surgeon Lieutenant Jan. 29, 1896. Promoted Captain *R.A.M.C.* Jan. 29, 1899, Major Oct. 29, 1907, Brevet Lieutenant-Colonel Feb. 18, 1915, and Lieutenant-Colonel March 1, 1915, he retired with the rank of Colonel Sept. 4, 1921. In South Africa 1899-1902, he took part in the advance on Kimberley, including actions at Belmont, Enslin, Modder River and Magersfontein. Actions at Poplar Grove, Dreifontein, Vet River (May 5 and 6, 1900) and Zand River. Actions near

Johannesburg, Pretoria and Diamond Hill (June 11 and 12, 1900). Actions at Belfast (Aug. 26 and 27, 1900). Operations in Cape Colony. Mentioned in despatches, he was awarded the *D.S.O.*, Queen's Medal with six Clasps and the King's Medal with two Clasps. He served in France from Aug. 15, 1914, till Oct. 28, 1917. Four times mentioned in despatches, he was created *C.M.G.*, received the Brevet of Lieutenant-Colonel, 1914 Star and Clasp, British War and Victory Medals.

RICHARD.—In Blair Wollaton, Nottingham, on Dec. 25, 1945, Colonel George Herbert Richard, late *R.A.M.C.*, Retired. Having taken the *M.R.C.S.* and *L.R.C.P.* in 1903, he was commissioned Lieutenant *R.A.M.C.* July 30, 1904, and Captain Jan. 30, 1908. He was placed on half pay on account of ill-health Jan. 25, 1910, to July 23, 1910. Promoted Major Oct. 15, 1915, Lieutenant-Colonel March 7, 1929, and Colonel March 7, 1933 (May 1, 1934), he retired Oct. 23, 1937. He held the Retired Pay Appointment, Chilwell, March 1, 1938, till March 7, 1940, when he was appointed President Command Medical Board, Northern Command. He reverted to Retired Pay July 28, 1942. He served in France from Aug. 18, 1914, till Nov. 10, 1915, and from Jan. 29, 1916, till July 30, 1917. He was awarded the 1914 Star, British War and Victory Medals.

JOURNAL OF THE ROYAL ARMY MEDICAL CORPS

Corps News:

FEBRUARY, 1946.

FROM THE "LONDON GAZETTE."

January 1, 1946.

B.E.M.

Bell, S/Sgt. R. W. 7259695.
Boardman, W.O.II. (actg.) E. L. 7359886.
Bostock, S/Sgt. S. 7385103.
Carter, Sgt. A. R. 7358753.
Chapman, Cpl. W. H. 2568098.
Cooling, W.O.II (actg.) T. W. 7354468.
Crannage, Pte. H. H. 14379194.
Crowe, Cpl. C. A. 7349597.
Darey, W.O.II (actg.) J. H. 841571.
Davis, Sgt. H. L. 7358085.
Denney, W.O.II (actg.) R. J. 7372107.
Donegan, S/Sgt. F. V. 7261381.
Hague, S/Sgt. L. 7384844.
Hughes, Sgt. J. H. 14234913.
Jones, L/Cpl. K. S. 7529782.
Long, Sgt. T. J. 7516423.
Long, S/Sgt. W. 7536200 (A. Dental Corps).
Masters, Sgt. G. F. 7394592.
Mellor, Cpl. J. E. 7380250.
Nichol, Pte. C. R. 14522360.
Rodgers, Sgt. F. 7370062.
Ruffels, S/Sgt. F. E. 7517710.
Smith, Cpl. F. 7347142.
Stephenson, S/Sgt. J. W. 7522491.
Terrey, S/Sgt. (actg.) L. A. 7360263.
Wellington, S/Sgt. W. L. 10511200 (A. Dental Corps).
Whitehouse, L/Cpl. L. F. G. 7383274.
Williamson, L/Cpl. K. S. 7388962.
Young, Sgt. E. 752227.

January 10.

MENTIONED (Burma).

Royal Army Medical Corps.

Col. (temp.) N. P. Breden.
Col. (temp.) W. J. Officer, O.B.E.
Col. (actg.) M. MacR. Paterson, O.B.E. (killed in action).
Lt.-Col. (temp.) D. G. Adamson.
Lt.-Col. (temp.) J. McK. Johnstone.
Lt.-Col. (temp.) W. G. MacDougall.
Lt.-Col. (temp.) A. J. Martin, O.B.E.
Lt.-Col. (temp.) D. J. O'Ryan.
Lt.-Col. (temp.) R. P. Smyth, O.B.E.
Lt.-Col. (temp.) J. A. Strong, M.B.E.
Lt.-Col. (temp.) W. G. Sutcliffe.

Lt.-Col. (actg.) W. L. Petter.
Maj. (temp.) T. Fitt.
Maj. (temp.) W. R. N. Friel.
Maj. (temp.) T. Griffiths.
Maj. (temp.) A. J. Moffett.
Maj. (temp.) H. G. Page.
Maj. (temp.) R. A. Philp.
Maj. (temp.) A. E. G. Ridgway.
Maj. (temp.) J. G. Scott, M.B.E.
Maj. (temp.) R. K. A. Van Someren.
Maj. (temp.) R. Wigglesworth.
Capt. D. M. P. R. Clarke.
Capt. H. D. Cockburn, M.C.
Capt. L. R. Dalton.
Capt. W. Drummond.
Capt. J. A. Farrell.
Capt. P. E. Helme.
Capt. M. H. Hughes.
Capt. (Qr.-Mr.) J. H. Humble.
Capt. J. F. Mark.
Capt. C. M. McGeoch.
Capt. J. W. F. Richardson.
Capt. M. F. Ronayne.
Capt. I. H. Stewart.
Capt. A. H. Williams.
Capt. (temp.) (Qr.-Mr.) H. V. Hatfield.
Capt. (temp.) J. A. McPherson.
Capt. (actg.) P. R. Robinson.
Lt. (Qr.-Mr.) G. H. F. Beare.
7350338 W.O.I. J. H. Goodings.
7524250 W.O.I. C. K. Margetson.
7400389 W.O.I. G. B. Somerset.
7354839 W.O.II. N. H. Mackley.
7374663 W.O.II. H. J. Robinson.
7363700 S/Sgt. W. J. Ross.
7349059 S/Sgt. E. W. Stapleford.
7520700 Sgt. F. R. Pike.
14581728 Cpl. G. E. Harley.
7403190 Cpl. S. Hughes.
7533164 Cpl. T. Samuel.
7399004 Cpl. (actg.) H. Sheffield.
7377676 Lce.-Cpl. W. H. Evans.
7399012 Lce.-Cpl. R. B. Smith.
7370700 Lce.-Cpl. W. Tuffy.
7386324 Lce.-Cpl. D. Walker.
7399097 Pte. W. H. McGhie.
6348787 Pte. H. R. Nolson.
2574035 Pte. F. P. Northey.

The Army Dental Corps.

Maj. (temp.) A. R. Henwood.

January 17

C.B.E.

Winter, T/Brig. H. G., *M.C.*, *V.H.S.*

O.B.E.

Baker, T/Lt.-Col. D. M.
Dunlop, A/Lt.-Col. K. J.
Ingram, T/Lt.-Col. H. V.
Johnson, T/Lt.-Col. R. T.
McIntosh, T/Lt.-Col. J. McI. D.
Summerfield, P/Matron, A. McC., *R.R.C.*
Q.A.I.M.N.S.
Wolstenholme, T/Lt.-Col. W. H., *M.B.E.*

M.B.E.

Craig, Capt. G. A.
Crawford, T/Major J. V.
Drummond, T/Major W.
Evans, T/Major F. E., *M.C.*
Heslop, T/Lt.-Col. J. F.
Johnson, Sister C. M., Q.A.I.M.N.S.R.
Kelly, Capt. (Qr.-Mr.) L.
MacGeoch, Capt. C. M.
McDiarmid, Capt. A.
Myers, Capt. C. E. S.
Page, T/Major H. G.
Rentoul, Capt. E.
Scrivener, T/Major J. P.

M.C.

Ramsay, T/Major W. J.
Clarke, Capt. E. G. W.
Willson, Capt. L.

B.E.M.

Hope, S/Sgt. W. E. 7363743.
Rappold, Sgt. F. 7399178.
White, Sgt. G. R. H. 7519569.

D.C.M.

Winter, A/W.O.I. W. A. 7263180.

MENTIONED (Italy).

Drummond, T/Col. W. A. D., *O.B.E.*
Spilsted, S/Sgt. V. A. 7520334.
Farwell, Pte. F. A. 7519925.

R.R.C. (Burma).

Gannon, A/P. Matron M.A., T.A.N.S.
Hobday, S/Sister B., Q.A.I.M.N.S.R.
Maunsell, Sister B. W. C., Q.A.I.M.N.S.R.
Miller, S/Sister E. M., *A.R.R.C.*, T.A.N.S.
Powell, A/P. Matron G. B., Q.A.I.M.N.S.
Price, Sister C. V., Q.A.I.M.N.S.R.
Sarson, Sister (Mrs) A. B., Q.A.I.M.N.S.R.
Smith, Sister E. A., *A.R.R.C.*, Q.A.I.M.N.S.R.
Winward, A/P. Matron J. M., Q.A.I.M.N.S.R.

A.R.R.C.

Burton, Sister M. A., Q.A.I.M.N.S.R.
Chadwick, Sister F., Q.A.I.M.N.S.R.
Christison, Sister (Mrs) M. E., Q.A.I.M.N.S.R.
Conner, Sister E., Q.A.I.M.N.S.
Doherty, Sister A., Q.A.I.M.N.S.R.
Ferguson, Sister M. J., Q.A.I.M.N.S.R.
Cavin, Sister M., Q.A.I.M.N.S.R.

George, Sister A. M., Q.A.I.M.N.S.R.
Gouldsbury, Sister (Mrs) E. M., Q.A.I.M.N.S.R.
Leake, Sister D., Q.A.I.M.N.S.R.
Lloyd (nee Courtney) Sister (Mrs.) A. L.,
Q.A.I.M.N.S.R.
MacGillivray, Sister M., Q.A.I.M.N.S.R.
Munday, Sister J. M., T.A.N.S.
Organ, Sister K. E., Q.A.I.M.N.S.R.
Pritchard, Sister I., Q.A.I.M.N.S.R.
Rawes, Sister E. M., T.A.N.S.
Rippon, Sister-in-Charge M.S., Q.A.I.M.N.S.R.
Roberts, Sister M., Q.A.I.M.N.S.R.

January 24.

(North West Europe)

K.B.E.

Phillips, Maj.-Gen. E., *C.B.*, *C.B.E.*, *D.S.O.*,
M.C.

C.B.E.

Debenham, L/Brig. R. K., *O.B.E.*
Fulton, A/Brig. G. K., *M.B.E.*

D.S.O. (Bar).

MacEwan, T/Col. M., *D.S.O.*, *O.B.E.*, *D.F.C.*,
T.D.

D.S.O.

Summers, Lt.-Col. M. H., *T.D.*
Anderson, T/Lt.-Col. W. M. E.
Cowie, T/Lt.-Col. A.
Lassen, T/Lt.-Col. E. H. P.

O.B.E.

Bainbridge, T/Lt.-Col. C.
Baxendine, T/Lt.-Col. W. P. (A.D. Corps).
Brennan, A/Lt.-Col. H. V., *M.B.E.*
Browne, T/Lt.-Col. E. C. (A.D. Corps).
Caird, T/Lt.-Col. J. C.
Handley, T/Lt.-Col. R. S.
Hope, T/Lt.-Col. G. H. G., *M.C.*
Hutchinson, T/Lt.-Col. D. F.
Jackson, A/Col. W. D., *M.C.*
Kane, T/Lt.-Col. G. A., *T.D.*
Lowdon, T/Lt.-Col. A. G. R.
Mackay, T/Lt.-Col. R. L.
Miller, A/Col. F. C., *M.C.*
Mitchell, T/Lt.-Col. G. A.
Neill, T/Lt.-Col. J.
Oram, T/Col. A. R., *M.C.*
Rutherford, Lt.-Col. R., *T.D.*
Saunders, T/Lt.-Col. K. G. W.
Sissons, T/Lt.-Col. H.
Tait, T/Lt.-Col. J. M.
Warren, T/Lt.-Col. F. W. A., *T.D.*

M.B.E.

Aubrey, T/Maj. I., *M.C.*
Aylett, T/Maj. S. O.
Barracrough, T/Maj. R.
Bleasdale, T/Maj. P. W. H.
Chisholm, T/Maj. W. N.
Conway, W.O.I. G. P. No. 7261664.
Davies, T/Maj. C. H.
Davison, T/Maj. M. H. A.
Dedow, T/Maj. P. F.
Elliot, T/Maj. C. M.

Hardie, Capt. P. J.
 Hearn, T/Maj. G. W.
 Hodgson, T/Maj. G. A.
 Hughes, A/Lt.-Col. K. E. A.
 Hughes, Lt. R. J.
 King, W.O.I. D. G. No. 2871132.
 Loden, T/Maj. A. E.
 McGhie, W.O.II. D. No. 7522579.
 McGrigor, Capt. R. B.
 Martyn, Capt. D. M. (A.D. Corps)
 Mayger, W.O.I. L. E. No. 7343474.
 Mills, Lt. W.
 Moyle, Capt. (Q.M.) A. E.
 Muir, Capt. D. D.
 Murray, Capt. A. D. D.
 Pearson, T/Maj. H. H. I.
 Phillips, T/Lt.-Col. R. J.
 Quaintance, W.O.I. D. E.
 Raistrick, T/Maj. S. F.
 Richardson, T/Maj. W. D.
 Roberts, T/Maj. (Q.M.) W. T.
 Ross, T/Maj. G. M.
 Ross, T/Maj. (Q.M.) W. C., *D.C.M.*
 Scriven, Maj. W. H.
 Simon, T/Maj. W. E.
 Thomson, Maj. A. P. D.
 Tuckett, T/Maj. C. I.
 Wilson, T/Maj. K. S.

M.C.

Beetham, Capt. K. W.
 Cooper, Capt. L. S.
 Gallagher, Lt. W. J.
 Haldane, Capt. J. H.
 Kershaw, Capt. H. M.
 McPherson, Capt. G. H.
 Marshall, Capt. H. E. S.
 Mott, Capt. J. G.
 Watts, T/Maj. J. C.
 Whiteside, Capt. C. T. H.
 Wolfe, Capt. W. J. W.

B.E.M.

Lynn, Pte. J. 7378662.
 Seymour, S/Sgt. D. R. 7523568.
 Woodford, Sgt. J. S. 7522892.

D.C.M.

Wadge, L.Cpl. E. J. 7358474.

M.M.

Cheshire, A/Sgt. A. T. 7356953.
 Greenwood, Sgt. H. 7345051.
 O'Sullivan, Sgt. O. 7263975.
 Smith, Sgt. M. P. 7347981.

A.R.R.C.

Albrecht, Sister M. P. A., Q.A.I.M.N.S.
 Gall, Sister Mrs. V., Q.A.I.M.N.S.
 McLennan, A/S Sister M., Q.A.I.M.N.S.
 Cleghorn, Sister M., Q.A.I.M.N.S.
 Colman, Sister M., Q.A.I.M.N.S.
 James, Sister B. V., Q.A.I.M.N.S.
 Langridge, Sister M. O., Q.A.I.M.N.S.
 Mitchell, Sister Mrs. M. E., Q.A.I.M.N.S.
 O'Hare, Sister M. A., Q.A.I.M.N.S.
 Quinton, Sister E. D., Q.A.I.M.N.S.

Seeley, Sister M. A., Q.A.I.M.N.S.
 Slater, Sister H. W., Q.A.I.M.N.S.
 Robertson, Sister B. M., T.A.N.S.
 Walters, Sister M., T.A.N.S.

January 25.

KING'S COMMENDATION (FOR BRAVE CONDUCT)

Reid, T/Maj. G. C. K.

January 31

M.B.E.

Mitchell, W.O.II., V. C., 7257615.

MENTIONED (" in the field ")

Mackay, T/Maj. R., *M.C.*
 Weston, Capt. A. H.
 Wodding, Capt. J. E.

EFFICIENCY DECORATION

Croft, T/Col. C. R.
 Mitchell, T/Lt.-Col. P. R., *O.B.E.*
 Wimbush, T/Lt.-Col. H. G.
 Adams, T/Maj. G. S.
 Pitts, T/Maj. G. T.
 Sandberg, Maj. R. S. T. (T.A.R.O.) (A.D. Corps).

February 21

(" in the field ")

O.B.E.

Hennessy, T/Lt.-Col. E. M.

M.C.

Crook, Capt. A.
 Gourevitch, Capt. A.

MENTIONED

Samuel, Lt.-Col. T. A. S., *M.C.*, *T.D.*
 Barber, T/Maj. S. W., *M.B.E.*
 Williamson, Lt. S. T.

(" while prisoner of war ")

M.B.E.

Gibbens, Capt. T. C. N.
 MacLeod, T/Maj. W. M.
 Norman, Capt. A. P.
 Readman, Capt. J. E.
 Stallard, Capt. A. F.
 Tate, Capt. H. T.
 Wilkinson, Capt. A. A. (A.D. Corps)
 Wykes, Capt. H. W.

B.E.M.

Burborough, Pte. R. F. 7519207.
 Cave, Cpl. A. 7349038.
 Chantler, L/Cpl. D. E. 7347005.
 Day, Pte. C. 7402899.
 Grime, Cpl. F. 7354327.
 MacCaskill, Pte. J. W. 7348876.
 Martin, Pte. H. L. 7360548.
 Watling, Pte. T. 7365852.

MENTIONED

Royal Army Medical Corps.

O'Meara, Lt.-Col. F. J.
 Kinnear, Maj. W. L., *M.B.E.*
 Smyth, Maj. G. G. E.
 Fosbrooke, T/Maj. J. M.
 Moore, T/Maj. E.
 Learner, Capt. J. A.
 MacRae, Capt. D. J.
 Mulligan, Capt. J. A. S.
 Park, Capt. T. M.
 Beaumont, S/Sgt. I., 7519852.
 Gascoigne, S/Sgt. W. E., 7521915.
 Saunders, S/Sgt. D. H., 7348413.
 Spencer, S/Sgt. J. H., 6077981.
 Brown, Sgt. E. M., 7523811.
 Cupit, Sgt. R. A., 7346751.
 Dixon, Sgt. M., 7261246.
 Thomas, Sgt. O. C., 7348674.
 Fox, L/Sgt. H. G. L., 7356803.
 Morice, L/Sgt. H. B., 7357765.
 Simpson, L/Sgt. W., 7356619.
 Fletcher, Cpl. B., 7356876.
 Robson, Cpl. S. F., 7390784.
 Scotcher, Cpl. J. B., 7363157.
 Willson, Cpl. J. R., 6398844.
 Churcher, L/Cpl. R., 7369272.
 Turner, L/Cpl. A. H., 7365593.
 Anderson, Pte. A., 7358187.
 Bloomfield, Pte. H. S., 7358039.
 Booth, Pte. S. R., 7520314.
 Bunting, Pte. G. M., 7349341.
 Dryden, Pte. H., 7365822.
 Fearn, Pte. J. H., 7263989.
 Fogell, Pte. C. C., 7348392.
 Frith, Pte. E. J., 7378958.
 Gibbs, Pte. A. F., *B.E.M.*, 7347737.
 Hosea, Pte. J. D., 7519968.
 Hoyles, Pte. G. A., 7348886.
 MacCuiah, Pte. D. A., 2924776.
 MacNamara, Pte. J., 7516036.
 McDougal, Pte. W. A., 7349323.
 Ronan, Pte. T., 7357533.
 Whitehouse, Pte. D. W., 7363592.
 Williams, Pte. G. W., 7361111.

Army Dental Corps.

Crabb, Capt. H. F.
 Barton, Pte. E., 7538540.

January 8.—Col. D. C. Munro, *C.B.E.*, M.B., F.R.C.S. (Edin.) (14493), ret. pay, late R.A.M.C. to be a Consultant, Nov. 28, 1945, and is granted the local rank of Brig.

January 18.—Lt.-Col. H. A. Boyle (15757) having attained the age for retirement, is retained on the Active List (supern.) Jan 16, 1946.

January 22.—Maj.-Gen. L. T. Poole, *C.B.*, D.S.O., M.C., M.B. (4845), late R.A.M.C., on completion of four years in the rank, retires on ret. pay, January 23, 1946.

Short Service Comms.

Lt. (War Subs. Capt.) James Henderson Bennett, M.B. (239219), from R.A.M.C. (Emerg.

Commn.), is granted a short service commn. in the rank of Lt., Aug. 15, 1942, and to be Capt. Aug. 15, 1943, with seniority next below Capt. R. S. McClelland.

Capt. J. E. Miller, M.C. (163133), is appointed to a permanent commn., Sept. 1, 1945, retaining his present seniority.

January 25.—Lt.-Col. W. J. Robertson, M.B. (14375) from R.A.M.C., to be Col. Dec. 15, 1945, with seniority, Sept. 30, 1944. (Substituted for the notifi. in *Gazette* (Supplement) dated Dec. 14, 1945.)

The notifi. regarding Lt.-Col. F. R. H. Mollan, *O.B.E.*, M.C. (5666), in *Gazette* (Supplement) dated Dec. 18, 1945, is cancelled.

Lt. (Qr.-Mr.) (War Subs. Capt. (Qr.-Mr.)) F. J. Campbell (123556) to be Capt. (Qr.-Mr.), Jan. 24, 1946.

February 1.—Maj. P. J. L. Capon (39084) to be Lt.-Col., Dec. 15, 1945. (Substituted for the notifi. in *Gazette* (Supplement) dated Dec. 11, 1945.)

Maj. K. McNeill, *O.B.E.*, M.B. (39088) to be Lt.-Col. Dec. 16, 1945. (Substituted for the notifi. in *Gazette* (Supplement) dated Dec. 18, 1945.)

Maj. W. H. Scriven (30088) to be Lt.-Col., Jan. 16, 1946. (Substituted for the notifi. in *Gazette* (Supplement) dated Jan. 4, 1946.)

Maj. P. Dwyer, M.B. (39086) to be Lt.-Col., Jan. 3, 1946. (Substituted for the notifi. in *Gazette* (Supplement) dated Dec. 18, 1945.)

Capt. S. J. Hepworth, M.B. (100963) resigns his commn., Jan. 29, 1946, and is granted the hon. rank of Maj.

February 5.—Lt. (Qr.-Mr.) (War Subs. Capt. (Qr.-Mr.)) A. C. Kilminster (120422) to be Capt. (Qr.-Mr.), Feb. 5, 1946.

February 8.—War Subs. Maj. A. F. H. Keatinge, M.C., M.B. (70109), to be Maj., Jan. 1, 1946.

Capt. R. D. Menzies, M.B. (68990), to be Maj., Feb. 1, 1946.

Short Service Commn.

Lt. (War Subs. Capt.) L. R. Taylor (136807), from Emerg. Commn. to be Lt., June 13, 1940, and to be Capt., June 13, 1941 (with seniority next below Capt. A. M. Buchanan).

February 12.—Lt.-Col. A. C. Taylor (15752) having attained the age for retirement, is retained on the Active List supern., Feb. 12, 1946.

February 15.—Col. H. N. Sealy (8102) late R.A.M.C. retires on ret. pay Feb. 16, 1946.

Maj. W. H. Scriven (30088) to be Lt.-Col. Jan. 7, 1946. (Substituted for the notifi. in *Gazette* (Supplement) dated Jan. 29, 1946.)

Capt. A. J. A. Gray (65808) to be Maj., Aug. 11, 1940. (Substituted for the notifi. in *Gazette* (Supplement) dated Oct. 24, 1944.)

Lt.-Col. W. Bisset, M.C., M.B. (15684), is restored to the rank of Col., Oct. 21, 1945.

Col. W. Bisset, *M.C.*, *M.B.* (1684), retires on ret. pay, Oct. 21, 1945, and is granted the hon. rank of Brig.

Lt.-Col. G. T. Garraway (14974), having attained the age limit of retirement, is retained on the Active List supern., Feb. 16, 1946.

REGULAR ARMY RESERVE OF OFFICERS.

January 15.—Maj. F. P. Rankin, *O.B.E.*, *M.B.* (50570) ceases to belong to the Res. of Offrs. on account of disability, Jan. 16, 1946.

January 22.—Capt. (Bt.-Maj.) P. G. Tuohy, *M.B.* (5960), having exceeded the age limit of liability to recall, ceases to belong to the Res. of Offrs., Jan. 2, 1946.

ARMY DENTAL CORPS.

Short Service Commn.

January 22.—Capt. C. H. Greaves (114321) is appt. to a permanent commn., Jan. 16, 1946, retaining his present seniority.

Maj. J. L. Craig, *M.C.* (34013), having exceeded the age limit, retires on ret. pay, Jan. 21, 1946, and is granted the hon. rank of Lt.-Col.

February 5.—Capt. F. K. Johnson (71722) retires on account of disability, Dec. 27, 1945, and is granted the hon. rank of Maj.

February 12.—Capt. C. H. James (69258) Short Service Offr., is appt. to a permanent commn., Sept. 7, 1942, retaining his present seniority.

February 15.—Capt. R. Edwards, *M.B.E.* (67335), to be Maj., Feb. 11, 1946.

Capt. D. N. Watson (116802) Short Service Commn. to be appt. to a permanent commn., Feb. 15, 1946, retaining his present seniority.

DEATHS.

ARMSTRONG.—On Oct. 19, 1943, while a Prisoner of War in Japanese hands, Lieutenant-Colonel Cyril Armstrong, *R.A.M.C.* Born May 11, 1893, he took the *M.B.* Durham in 1914 and was mobilized as a Lieutenant *R.A.M.C.S.R.* September 4, 1914. He was appointed to a regular commission as Captain June 1, 1920. He was promoted Major September 4, 1926, and Lieutenant-Colonel September 2, 1937. He took the *D.P.H.*, Belfast, in 1926. He served in France from October 25, 1914, till December 17, 1915, being awarded the *M.B.E.*, 1914 Star, British War and Victory Medals.

Lieutenant-Colonel D. C. Bowie writes:—

"The news of the death of Cyril Armstrong while a Prisoner of War in Japanese hands in Hong Kong will raise the liveliest feelings of regret amongst his friends. Before going to China he was Physician and Surgeon of the Royal Hospital, Chelsea, from 1935 till 1939, and he went to command the British Military Hospital, Shanghai. When the Far East War began he was commanding the Combined Military Hospital at Whitfield Barracks, Hong Kong. This closed in Kowloon on the outbreak of war and removed to the Island of Hong Kong, but in its new site it was rapidly overrun after the Japanese landed on the Island on the night of December 18/19, 1941, and he had a most unpleasant experience, when he was held as a hostage for a

time by the Japanese. His hospital was closed down after the surrender and he then opened a new Indian Hospital in St. Albert's Convent for a time when that, too, was closed and he was sent to P.O.W. Camps in Kowloon. Here he did a great deal of good work under most trying conditions before his health broke down. Of a quiet studious disposition he had a North Country 'pawkiness' that flashed out unexpectedly sometimes, and he will be missed by his many friends in the Corps. He is survived by his wife, a son now serving in the Rifle Brigade, and a daughter."

STRACHAN.—In London on Nov. 22, 1945, Colonel Edward Alexander Strachan. Born March 12, 1886, he took the *M.B.*, Edinburgh, in 1908 and was commissioned Lieutenant *R.A.M.C.* Jan. 26, 1912. He was promoted Captain March 30, 1915, and Major Jan. 26, 1924. He was Physician and Surgeon, Royal Hospital, Chelsea, Aug. 1, 1927, till Sept. 13, 1931. Promoted Lieutenant-Colonel May 1, 1934, he was appointed Surgeon Lieutenant-Colonel Life Guards July 1, 1934. From Nov. 11, 1939, till Oct. 22, 1940, he was *A.D.M.S.* 1 Cavalry Division and subsequently *A.D.M.S.* North Highland Area. In the war 1914-1918 he served in Mesopotamia Sept. and Oct., 1915, and again from Oct., 1917, till Oct., 1918, being mentioned in despatches and

awarded the 1914-15 Star, British War and Victory Medals. In the late war he served in Palestine in 1940.

Major-General D. T. Richardson, *C.B., M.C.*, writes :—

"Many of us older members of the Corps have felt very deeply the passing of our good friend and comrade Eddie Strachan, especially those of us who have known him from our subaltern days and even earlier.

"To write of him but in a simple way would not suit the man for he was essentially a plain, kindly honest Scot; in truth, to do him full justice I fain would use the BROAD SCOTS that both he and I understood and in which those things nearest the heart can be so much better expressed.

"His friendship and mine went beyond the boundaries of the Corps, yet it was within them that we became fast friends. He had two qualities which I admire above all others, a stark honesty and true loyalty to his friends. It was these attributes together with a gentle simplicity and dry humour that made him so endeared to us all. I can well understand how much he was appreciated by the officers who served under him during these later years, for consideration and kindness were part of his nature.

"Golf was his main recreation although he had a keen interest in Cricket and Rugby. To really enjoy a game on the links at its very best was to play with him. A pawky golfer with an extraordinary amount of skill at the short game, it was the sheer pleasure of it that made him an ideal partner or opponent

and, indeed, he would be a poor sportsman who did not succumb to the infection of his spirit on the links.

"He regularly attended the Army Golf Championship and the meetings of our own Association of which he was at one period the Secretary, during which time Golf in the Corps was never more popular, undoubtedly due to his enthusiasm and keenness.

"Well he has gone and we in the Corps are the poorer for his going. When again, if ever, will such a comrade be found in our ranks?

"There are many sad hearts that mourn you, Eddie, but proud are we all to have known and enjoyed your friendship."

WHELTON.—In Mount Vernon Hospital, Northwood, on Jan. 12, 1946, Colonel Michael James Whelton, *M.D.*, late *R.A.M.C.* Born June 17, 1892, he took the *M.B.* of the National University of Ireland in 1916 and proceeded to the *M.D.* in 1926. He served as a Lieutenant, Medical Branch of the *R.A.F.* from July 15, 1918, till promoted Captain a year later and was transferred to the unemployed list Nov. 5, 1919. He was commissioned Lieutenant *R.A.M.C.* June 1, 1920. Promoted Captain May 13, 1922, Major Nov. 13, 1930, and Lieutenant-Colonel Aug. 17, 1944. He had held the rank of Temporary Colonel from Nov. 4, 1942. He served in Waziristan 1921-1924 receiving the Medal with Clasp. He served with the Central Mediterranean Force from Nov. 10, 1942, till July 24, 1945, being mentioned in despatches.

JOURNAL OF THE ROYAL ARMY MEDICAL CORPS

Corps News.

MARCH, 1946.

FROM THE "LONDON GAZETTE."

HONOURS AND AWARDS.

("in the field")

February 28, 1946.

C.B.E.

Cameron, T/Brig. W. M., O.B.E.

O.B.E.

Dyson, A/Matron, E. M. B., Q.A.I.M.N.S.

M.B.E.

Beaman, Sister Mrs. M., Q.A.I.M.N.S.

Gittings, T/Maj. S. J. (A.D. Corps)

Green, T/Lt.-Col. R. H. (A.D. Corps)

Forrest-Hay, Capt. G., R.A.M.C.

Turner, Sister, E. M., Q.A.I.M.N.S.

R.R.C.

Thomson, Sister M. K., Q.A.I.M.N.S.

Gordon, Sister A. F., T.A.N.S.

MENTIONED.

O'Connor-Cuffey, T/Maj. D. E.

Caldwell, Capt. G. F. A.

Quartermaster, Sgt. G. E. 7356881

Brown, Sgt. L. V. 7357849

Scott, L/Sgt. L. E. 7356494

Hosea, Pte. J. D. 7519968

MacCuiah, Pte. D. A. 2924776

March 14.

THE EFFICIENCY DECORATION.

Stark, T/Col. R. A., M.C. (T.A.R.O.)

Murphy, Hon. Lt./Col. T. T. P.

Nichols, Major W. M.

February 22.—Maj.-Gen. D. T. Richardson, C.B., M.C., M.B. (3014), late R.A.M.C., on completion of four years in the rank, retires on ret. pay, Feb. 4, 1946.

Capt. W. M. Stewart, M.B. (73590), is apptd. to a permanent commn., Oct. 27, 1942, retaining his present seniority.

February 26.—Col. (local Brig.) D. Fettes, O.B.E., M.B., F.R.C.S. (Edin.) (15746) late R.A.M.C., is apptd. Hon. Surgeon to The King with effect from Nov. 28, 1945, vice Maj.-Gen. D. C. Munro, C.B., C.B.E., M.B., F.R.C.S. (Edin.), late R.A.M.C., retired.

Lt.-Col. H. J. Bensted, O.B.E., M.C. (15778) retires on ret. pay, Feb. 26, 1946.

Lt.-Col. A. L. Robb, M.B. (3020) retires on ret. pay on account of disability, Feb. 27, 1946, and is granted the hon. rank of Col.

March 1.—Col. (Temp. Brig.) F. Harris, C.B.E., M.C., M.B. (15707), late R.A.M.C., is apptd. Hon. Surgeon to The King with effect from Feb. 4, 1946, vice Maj.-Gen. D. T. Richardson, C.B., M.C., M.B., late R.A.M.C., retired.

Col. (Temp. Brig.) H. A. Sandiford, M.C., M.B. (15676) late R.A.M.C., is apptd. Hon. Physician to The King with effect from Jan. 23, 1946, vice Maj.-Gen. L. T. Poole, C.B., D.S.O., M.C., M.B., late R.A.M.C., retired.

March 5.—Lt.-Col. C. O. Shackleton, M.B. (8746), from R.A.M.C. to be Col., Jan. 16, 1946, with seniority from Aug. 10, 1939, next above Col. W. D. Arthur, M.B.E. (15749), late R.A.M.C.

Short Service Commns.

Lt. J. H. Gibson, M.D. (78710) to be Capt., Oct. 21, 1939, with seniority, Oct. 21, 1938, and precedence next below Capt. J. Mackay-Dick. (Substituted for the notifn. in *Gazette* (Supplement) dated Nov. 28, 1939.)

The appt. of Lt. J. H. Gibson, M.D. (78710) is ante-dated to Oct. 21, 1937, under the provisions of Art. 39, Royal Warrant for Pay and Promotion, 1940, but not to carry pay and allces. prior to Oct. 21, 1939. (Substituted for the notifn. in *Gazette* (Supplement) dated Nov. 18, 1938.)

Lt. (War Subs. Capt.) Brian Devlin, M.B. (252477), from R.A.M.C. (Emerg. Commn.) is granted a short service commn. in the rank of Lt., Nov. 14, 1942, and to be Capt., Nov. 14, 1943.

Capt. H. F. Lambert, M.D. (73582), retires, Feb. 12, 1946.

March 8.—Col. R. C. Priest, C.B., M.D., F.R.C.P. (14073) late R.A.M.C., ret. pay, is restored to the rank of Maj.-Gen., Mar. 5, 1946.

March 12.—Maj. J. W. Malcolm, O.B.E., M.C., M.B. (26350), to be Lt.-Col., Jan. 16, 1946, with seniority, Mar. 1, 1942 next above Lt.-Col. L. M. Rowlette, D.S.O., M.C. (15764).

Maj. J. C. Collins (1524) to be Lt.-Col., Jan. 16, 1946, with seniority, Oct. 31, 1943, next above Lt.-Col. W. I. FitzG. Powell (5781).

Maj. D. C. Bowie, M.B., F.R.C.S. (Edin.) (5540), to be Lt.-Col. Jan. 16, 1946, with seniority, June 1, 1944, next above Lt.-Col. C. A. Whitfield, M.B. (15672)

Maj. (Qr.-Mr.) C. E. Bull, *M.B.E., D.C.M.* (58866), to be Lt.-Col. (Qr.-Mr.) Feb. 1, 1946.

Lt.-Col. R. A. Mansell, *O.B.E., M.B.* (14372), on attaining the age for retirement, is retained on the Active List (supern.), Mar. 1, 1946.

Lt.-Col. E. C. Linton (10643) retires on ret. pay, Mar. 12, 1946, and is granted the hon. rank of Col.

March 15.—Col. R. J. Blackham, *C.B., C.M.G., C.I.E., D.S.O., M.D.* (14347) late R.A.M.C. ret. re-employd., on ceasing to be employd. is granted the hon. rank of Maj.-Gen., Jan. 30, 1936.

March 19.—Lt.-Col. C. B. C. Anderson *O.B.E., M.B., F.R.C.S. (Edin.)* (5755) retires on ret. pay, Dec. 19, 1945.

THE ARMY DENTAL CORPS.

February 26.—Lt. (War Subs. Capt.) David James Stewart (136408) from Emerg. Commn., to be Lt., July 1, 1940 and to be Capt., July 1, 1941.

March 1.—Capt. K. C. Blanthorne (86294), Short Service Commn., to be apptd. to a permanent commn., Sept. 4, 1945, retaining his present seniority.

DEATHS.

DAVIDSON.—On Dec. 24, 1945, Colonel John Stewart Davidson, late R.A.M.C., Retired. Born in Madagascar March 9, 1863, he took the M.B. Aberdeen, in 1885, and was commissioned Surgeon, afterwards Surgeon Captain, July 28, 1886. Promoted Major R.A.M.C. July 28, 1898, Lieutenant-Colonel July 28, 1906, and Colonel March 1, 1915, he retired Oct. 1, 1919. He served in France from Sept. 2, 1914, till May 25, 1915, and again from Nov. 10, 1915, till April 2, 1916, receiving the 1914 Star and Clasp, British War and Victory Medals.

STEPHENS.—On Feb. 20, 1946, Major Frederick Archer Stephens, *D.S.O., R.A.M.C.*, Retired. Second son of the late Thompson Stephens of Wanderwell, Bridport, he was born in Walditch, Dorset, on Jan. 5, 1872, and took the L.R.C.P. and L.R.C.S. Edinburgh, and the L.R.F.P.S. Glasgow, in 1898. Having served as a Civil Surgeon from May 11 to Nov. 13, 1900, he was commissioned Lieutenant, R.A.M.C., Nov. 14, 1900. Promoted Captain Nov. 14, 1903, and Major Nov. 14, 1912, he retired Nov. 14, 1920. He took part in the operations in Cape Colony, Orange River Colony and Transvaal 1900-1902, being awarded the Queen's Medal with three Clasps and the King's Medal with two Clasps. He served in France from Aug. 18, 1914, till Feb. 1, 1915, and in Macedonia from June 15, 1916, till Dec. 9, 1917, and again from Aug. 3, 1918, till Jan. 12, 1919. Mentioned in despatches he received the *D.S.O., 1914-15 Star*, British War and Victory Medals, and 4th Class of the Order of St. Sava.

CARR.—In Armadale, Hereford, on Feb. 24, 1946, Lieutenant-Colonel Gerald Francis Carr, *M.C., R.A.M.C.*, Retired. Born May 21, 1884, he took the *M.R.C.S. England*, and the *L.R.C.P. London*, in 1908. Commissioned Lieutenant, R.A.M.C.T.F., attached West Riding Division T.F. Dec. 11, 1914, he was promoted Captain, June 11,

1915. He was appointed to a regular commission R.A.M.C. Aug. 1, 1919. Promoted Major R.A.M.C. Dec. 11, 1926, and Brevet Lieutenant-Colonel July 1, 1938, he retired May 21, 1939. He rejoined Oct. 2, 1939, but was relegated to Retired Pay Oct. 17, 1940. He served in France from April 13, 1915, till April 20, 1918, receiving the *M.C., 1914-15 Star*, British War and Victory Medals. The *M.C.* was awarded for conspicuous gallantry and devotion to duty. Although the advanced Dressing Station of which he was in charge was shelled out three times, by his coolness and example he got all the patients and personnel safely away and re-established his Dressing Station without interrupting the evacuation. He also served in Burma in 1930-1932 receiving the medal with Clasp.

PALMER.—On March 2, 1946, in the Norfolk and Norwich Hospital Lieutenant-Colonel Horace Kemp Palmer, *R.A.M.C.*, Retired. Born in Buxton, Norfolk, March 5, 1872, he took the *L.R.C.P. London*, and the *M.R.C.S. England*, in 1897, and was commissioned Lieutenant R.A.M.C. Jan. 28, 1899. Promoted Captain Jan. 28, 1902, Major Jan. 28, 1911, and Lieutenant-Colonel March 1, 1915, he was placed on half pay on account of ill-health March 20, 1919, and retired Dec. 16, 1920. In South Africa, he took part in the actions at Colesberg (Jan. 1, 1900, to Feb. 12, 1900), Relief of Kimberley, operations at Paardeberg (Feb. 17 to 22, 1900), actions at Poplar Grove, Dreifontein, Karee Siding and Zand River, actions near Johannesburg, Pretoria and Diamond Hill (June 11 and 12, 1900). Actions at Reit Vlei and Belfast (Aug. 26 and 27, 1900). Operations on Zululand Frontier of Natal in Sept. and Oct., 1901, being awarded the Queen's Medal with seven Clasps and the King's Medal with two Clasps. He served on the Macedonian Front in 1917 and 1918, being brought to notice for valuable services rendered in Communiqué Sept. 18, 1917.

JOURNAL OF THE ROYAL ARMY MEDICAL CORPS

Corps News.

APRIL, 1946.

FROM THE "LONDON GAZETTE."

March 22, 1946.—Lt.-Col. G. E. L. Simons (1152) having attained the age for retirement, is retained on the Active List (supern.), Mar. 8, 1946.

March 26.—Capt. A. J. N. Warrack, M.B. (73567), is apptd. to a permanent commn., Aug. 2, 1942, retaining his present seniority.

March 29.—

Short Service Commn.

Capt. L. R. Taylor (136807) is apptd. to a Permanent Commn., June 13, 1945, retaining his present seniority.

Capt. J. E. Vooght, M.B. (169481), is apptd. to a permanent commn., Jan. 31, 1946, retaining his present seniority.

Lt.-Col. J. W. Malcolm, O.B.E., M.C., M.B. (26350), having attained the age for retirement, is retained on the Active List (supern.), Jan. 18, 1946.

THE ARMY DENTAL CORPS.

March 22.—Capt. C. H. James (69258) to be Maj., Mar. 7, 1946.

R.A.M.C. GOLFING SOCIETY.

SUMMER MEETING, 1946, THURSDAY, JUNE 6, AT WALTON HEATH.

By courtesy of the Walton Heath Golf Club, Tadworth, Surrey.

EVENTS.

Morning, 09.30 hours: The "Vesey Holt Memorial Challenge Cup."

18 holes medal, play under handicap. Holder Lt.-Col. G. Harding, Aldershot Dist. Hcp. 12. (1939).

The winner will hold the cup for the ensuing year and both he and the runner-up will receive Society prizes.

A prize is also awarded for the best scratch score.

Afternoon, 14.30 hours: "Bogey" Competition, under handicap.

Society prizes for the best returns: (a) handicap 12 or under, (b) handicap 13 or over.

Presentation of prizes and ANNUAL GENERAL MEETING after tea.

Entries close on May 25.—Entry forms, which will soon be available from the Society's representatives as shown below, must reach the

Hon. Sec. together with the entry fee (2s. 6d. for each competition) on or before that date. There will be an optional sweepstake on each round (2s. 6d.).

Northern Command:

R.A.M.C. Golfing Society Representative, c/o D.D.M.S., Northern Command, York.

Southern:

Col. W. P. Croker (Interim-Captain of the Society), "The Coppice," Netley.

Western:

Col. P. J. Ryan, Hdqrs., Mid-Western District, Shrewsbury.

Eastern:

Maj. W. B. Hughes, Camp Reception Station, Warley.

Scottish and N. Ireland:

Lt.-Col. R. S. Dickie, c/o D.D.M.S., Scottish Command, Edinburgh.

Aldershot District:

Lt.-Col. C. E. Eccles, Louise Margaret Hospital, Aldershot.

R.A.M. College and London District:

Lt.-Col. G. T. W. Archer, Hdqrs., Mess, Millbank.

B.A.O.R.:

Brig. B. J. Daunt, Hdqrs., 8 Corps, B.A.O.R.

Green Fee, etc.—

Green Fee.. ..	5/- per visitor
Lunch	4/- per head
Tea	1/6 per head

Caddies.—Charge for caddies at Walton Heath is 15s. for the day, inclusive of lunch money and tip. There is a limited supply but the Sec., W. H. will endeavour to provide as many as possible. Competitors are individually responsible for settling up with the Caddy Master. A booked caddie must be paid for even if the competitor scratches at the last moment, unless he can arrange for another player to take him for the day.

Starting Times.—The President, Vice-President and Captain have right of way on the first tee. Competitors should report to the Hon. Sec.'s assistant as soon as they arrive.

An attempt will be made to allocate starting times on the day.

How to get to Walton Heath from London.

From *London Bridge Station to Tadworth* (approx. 45 mins.). Departures (subject to alterations in time table), 08.35, 08.55, 09.15, 09.36, 09.55, etc. From Tadworth Station to the Clubhouse is about $\frac{1}{2}$ mile. A taxi or two are generally plying for hire at the station.

From *Victoria Station to Sutton*, thence by L.P.T.B. *Bus 80A* (half hourly service) to *Walton Hill* which is 300 yards from the clubhouse. Journey from London to W.H. takes about 1 hour. Trains from Victoria fairly frequent.

D. C. MONRO, *Maj. Gen.,
Hon. Sec.*

DEATHS.

BELL.—In Tunbridge Wells on Feb. 27, 1946, Lieutenant-Colonel John Grenville Bell, D.S.O., R.A.M.C., Retired. Born Jan. 25, 1875, he took the M.B., Edinburgh, in 1899. He held the appointment of Civil Surgeon from March, 1900, till July, 1901, and again from March till July, 1902, being commissioned Lieutenant R.A.M.C. Jan. 31, 1903. Promoted Captain July 31, 1906, Major Oct. 31, 1914, Brevet Lieutenant-Colonel Jan. 1, 1919, and substantive Lieutenant-Colonel May 2, 1925, he retired Jan. 25, 1930. He held the appointment of Medical Inspector of Recruits, Central London Recruiting Depot, from Aug., 1937, till Oct., 1939. He first saw service in South Africa 1899–1902, taking part in the operations in Cape Colony, Orange River Colony and Transvaal, receiving the Queen's Medal with three Clasps and the King's Medal with two Clasps. He again saw service on the North-West Frontier of India in 1908, being awarded the Medal with Clasp. He served in Gallipoli and Egypt from March, 1915, till March, 1916, in France from March, 1916, till Nov., 1917, and in Italy from Nov., 1917, till March, 1919. Thrice mentioned in despatches he received the Brevet of Lieutenant-Colonel, the D.S.O., 1914–15 Star, British War and Victory Medals, and the Italian Public Health Silver Medal.

KNAGGS.—In Cheltenham on March 14, 1946, Colonel Henry Thomas Knaggs, C.B., C.M.G., late R.A.M.C., Retired. Born July 26, 1863, he took the L.R.C.P.L. and L.M. and L.R.C.S.I., in 1885. He took the M.B.,

Dublin, in 1893, and the D.P.H., Dublin, in 1906. Commissioned Surgeon (afterwards Surgeon Captain) July 28, 1886, he was promoted Major, R.A.M.C., July 28, 1898, Lieutenant-Colonel July 28, 1906, Colonel March 1, 1915, and retired Sept. 15, 1919. He was Secretary R.A.M.C. Fund and Officers' Benevolent Society, 1921 till 1929. In South Africa, 1899–1902, he took part in the operations in the Transvaal, Orange River Colony and Cape Colony, receiving the Queen's Medal with three Clasps and the King's Medal with two Clasps. He served in Egypt and with the Egyptian Expeditionary Force throughout the war of 1914–19. Twice mentioned in despatches, he was created C.B. and C.M.G. and awarded the 1914–15 Star, British War and Victory Medals.

MEARNS.—In Tunbridge Wells on March 22, 1946, Major Alexander Mearns, R.A.M.C., Retired. Born Dec. 20, 1889, he took the M.B., Edinburgh, in 1912 and the D.P.H., R.C.P.S., in 1921, and the D.T.M. & H. in 1931. Appointed Temporary Lieutenant, R.A.M.C., Dec. 16, 1914, he was promoted Temporary Captain Dec. 16, 1915, and received a regular commission June 1, 1919. He was promoted Major March 28, 1927, and retired Dec. 20, 1938. For a time he was Acting Assistant Medical Officer of Health, City of Westminster, and at the time of his death he was Acting Medical Officer of Health at Tunbridge Wells. He was D.A. Pathology in India in 1931 and 1932, and again from May, 1932, to May, 1935.



OFFICERS' PAY and the service that goes with it

Rates of pay of Army Officers are calculated, and amounts credited to individual accounts, by Holt & Co., the Banking House, to whom the Government has entrusted a share of this great branch of Service administration.

Whether the Officer is remaining in the Service or is returning to civil life, he will find that Holts possess a highly qualified organisation which can provide, in a personal and helpful way, every peacetime service common to other Private and Commercial Banks.

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JOURNAL

OF THE

ROYAL ARMY MEDICAL CORPS

Corps News.

MAY, 1946.

FROM THE "LONDON GAZETTE."
April 4, 1946.

M.B.E. (Far East)

Gavin, Sister, M., *A.R.R.C.*, *Q.A.I.M.N.S.*

R.R.C. (Hong Kong 1941)

Currie, *née* Davies, Sister M. A. L., *Q.A.I.M.N.S.*
North, Sister, M.A., *Q.A.I.M.N.S.*

A.R.R.C. (Hong Kong 1941)

Colthorpe, Sister G., *Q.A.I.M.N.S.*
Davies, Sister, E. F., *Q.A.I.M.N.S.*

MENTIONED (Hong Kong 1941)

Commands and Staff.

Colonel J. T. Simson, M.B. (1964) late *R.A.M.C.*

MENTIONED (N.W. Europe)

Commands and Staff.

Col. W. D. Anderton, *M.C.*, M.B. (26293), late
R.A.M.C.

Col. C. D. M. Buckley, *M.C.*, M.B. (22509), late
R.A.M.C.

Royal Army Medical Corps.

Brig. (temp.) H. L. G. Hughes, *C.B.E.*, *D.S.O.*,
M.C. (11060).

Brig. (loc.) A. E. Porritt, *C.B.E.*, M.B., M.S.,
F.R.C.S. (125494).

Col. (temp.) L. T. Furnivall, *D.S.O.*, (52313).

Col. (temp.) W. A. Robinson, *O.B.E.*, M.D.
(50009).

Col. (actg.) R. W. Fairbrother, M.D., *M.R.C.P.*
(85243).

Lt.-Col. A. Harrison-Hall, M.B., *M.R.C.P.*
(76646).

Lt.-Col. (temp.) W. M. Arnott, *T.D.*, M.B.
(43238).

Lt.-Col. (temp.) J. H. Bolton (100631).

Lt.-Col. (temp.) A. L. Eyre-Brook, M.B.,
F.R.C.S. (225951).

Lt.-Col. (temp.) C. L. Broomhead, *T.D.*, M.D.
(38469).

Lt.-Col. (temp.) J. Clay, M.B. (76026).

Lt.-Col. (temp.) P. Coleman, M.B. (67858).

Lt.-Col. (temp.) T. H. Crozier, M.D., *F.R.C.P.*
(127156).

Lt.-Col. (temp.) G. V. Davies, *F.R.C.S.* (2968).

Lt.-Col. (temp.) T. H. Dockrell, M.B. (66208).

Lt.-Col. (temp.) L. H. Howells, M.D., *M.R.C.P.*
(127638).

Lt.-Col. (temp.) A. F. Kennedy, *O.B.E.*, M.B.
(45045).

Lt.-Col. (temp.) J. C. Lindsay, M.B. (70162).

Lt.-Col. (temp.) M. J. Lindsey, *M.C.*, M.B.
(79384).

Lt.-Col. (temp.) M. Markowe, M.D. (127353).

Lt.-Col. (temp.) N. H. Martin, B.M., *M.R.C.P.*
(31377).

Lt.-Col. (temp.) T. Moore, M.B. (169499).

Lt.-Col. (temp.) R. J. G. Morrison, M.B.
(67302).

Lt.-Col. (temp.) F. Murgatroyd, M.D., *F.R.C.P.*
(142635).

Lt.-Col. (temp.) E. A. L. Murphy, *T.D.*, M.B.
(35460).

Lt.-Col. (temp.) J. W. Osborne, M.B., *M.R.C.P.*
(75401).

Lt.-Col. (temp.) W. M. Oxley (63803).

Lt.-Col. (temp.) G. D. Pirrie, M.B. (236895).

Lt.-Col. (temp.) C. B. Prowse, M.B., *M.R.C.P.*
(135369).

Lt.-Col. (temp.) W. A. McD. Scott, M.B.
(73565).

Lt.-Col. (temp.) J. Shields (67295).

Lt.-Col. (temp.) C. de V. Shortt, M.D. (173005).

Lt.-Col. (temp.) R. A. Smart, M.B. (70117).

Lt.-Col. (temp.) R. A. Stephen, M.D. (63177).

Lt.-Col. (temp.) J. P. Stewart, M.D., *F.R.C.S.*
(96288).

Lt.-Col. (temp.) W. Stewart, *M.B.E.*, M.B.
(70115).

Lt.-Col. (temp.) A. D. Young, *D.S.O.*, M.B.
(128689).

Maj. E. H. Evans, M.D., *M.R.C.P.* (70122).

Maj. J. A. C. Fleming, M.B., *F.R.C.S.* (75739).

Maj. E. R. Hargreaves, M.B. (195118).

Maj. B. F. Longbotham (57483).

Maj. (temp.) J. MacC. Almond, M.B. (119733).

Maj. (temp.) E. McL. Barbour, M.B. (161274).

Maj. (temp.) J. Borrowman, M.B. (133558).

Maj. (temp.) R. Y. Bullock, M.B. (127739).

Maj. (temp.) A. A. Byrne, *M.C.* (106820).

Maj. (temp.) G. G. Cochrane, M.B. (89840).

Maj. (temp.) H. H. Collier, M.B. (136419).

Maj. (temp.) J. L. Collis, M.D., *F.R.C.S.*
(309908).

Maj. (temp.) R. C. Cunningham, M.B. (297499).

Maj. (temp.) G. H. Darke, M.B., *F.R.C.S.*
(107780).

Maj. (temp.) W. N. Darling (128225).

Maj. (temp.) F. E. Dennison, M.D. (250389).

Maj. (temp.) W. N. Douglas, M.B. (102597).

Maj. (temp.) R. Glanvill, M.B. (89087).

Maj. (temp.) G. Gregg, M.B. (108108).

Maj. (temp.) A. B. Hamer, M.B., *F.R.C.S.*
(139360).

Maj. (temp.) J. M. Harker, *M.B.E.*, M.B.
(99408).

- Maj. (temp.) J. C. Harland, M.B., M.R.C.P. (99107).
 Maj. (temp.) G. J. Harrison (236353).
 Maj. (temp.) S. T. Henderson, M.B. (128660).
 Maj. (temp.) J. A. Hewitt (227060).
 Maj. (temp.) S. Howe (125431).
 Maj. (temp.) W. Hynes, M.B., F.R.C.S. (136110).
 Maj. (temp.) J. E. Marquis (231141).
 Maj. (temp.) R. J. Miller, M.B. (122749).
 Maj. (temp.) W. G. Mills, M.B. (88752).
 Maj. (temp.) C. R. Morgan (98579).
 Maj. (temp.) R. T. Nicholas, M.R.C.P. (248741).
 Maj. (temp.) D. J. Paddison (88485).
 Maj. (temp.) K. D. G. Reid, M.B. (99429).
 Maj. (temp.) I. B. Rees-Roberts (106846).
 Maj. (temp.) J. A. Ross (75559).
 Maj. (temp.) J. E. Royds, M.B. (118214).
 Maj. (temp.) G. R. Royston, M.D. (106637).
 Maj. (temp.) G. Sanders, M.B. (118169).
 Maj. (temp.) R. S. Thompson, M.B. (90823).
 Maj. (temp.) H. Hall-Tomkin, M.B. (56942).
 Maj. (temp.) M. Toohey, M.D., M.R.C.P. (216211).
 Maj. (temp.) A. M. Wadsworth, M.B. (100350).
 Maj. (temp.) F. R. Waldron, M.D. (257963).
 Maj. (temp.) J. Watt, M.C., M.B. (150249).
 Maj. (temp.) L. R. West, M.B., M.R.C.P. (188963).
 Maj. (temp.) H. F. Whalley, M.B. (87933).
 Maj. (temp.) A. E. Wilson, M.C., M.B. (115106).
 Maj. (temp.) J. W. Wishart, M.B. (123674).
 Maj. (actg.) W. J. Christie, M.B. (218957).
 Maj. (actg.) H. S. Lanceley, M.B. (106800).
 Capt. E. Anderson, M.B. (252549).
 Capt. J. Anderson, M.B. (195832).
 Capt. J. D. Binning, M.B. (301657).
 Capt. R. Black, M.B. (318034).
 Capt. J. N. Blair, M.B. (199568).
 Capt. F. M. Braines, M.B. (115471).
 Capt. (Qr.-Mr.) W. A. Buckley (231131).
 Capt. J. M. Childs (279119).
 Capt. S. Conlan, M.B. (260444).
 Capt. P. J. Cremin, M.B. (238396).
 Capt. W. R. Cunningham, M.B. (86643).
 Capt. Mrs. M. W. Davies, M.B. (135355).
 Capt. R. D. Dewar, M.B. (150746).
 Capt. A. H. Dickie, M.B. (101973).
 Capt. W. K. Douglas (287234).
 Capt. A. R. Ford (114199).
 Capt. W. G. French, M.B. (270673).
 Capt. T. Gibson, M.B., F.R.C.S. (309184).
 Capt. W. N. Gibson, M.B. (150038).
 Capt. D. H. Girdwood, M.B. (216869).
 Capt. (Qr.-Mr.) K. Goulden (216589).
 Capt. Miss M. B. Graham (250661).
 Capt. (Qr.-Mr.) A. H. Hicks (144053).
 Capt. (Qr.-Mr.) G. E. Howells (231122).
 Capt. A. Hughes, M.B. (279099).
 Capt. R. T. Kiddie, M.B. (175905).
 Capt. (Qr.-Mr.) J. Knecht, B.E.M. (227847).
 Capt. (Qr.-Mr.) R. C. Lane (147015).
 Capt. H. W. Lees (119638).
 Capt. R. Levy, M.B. (306340).
 Capt. M. P. Lewis (254088).
 Capt. N. A. Lewtas, M.B. (241259).
 Capt. E. MacLaine, O.B.E., M.B. (173463).
 Capt. A. D. Macrae, M.B. (199800).
 Capt. J. D. McCardel, M.B. (279101).
 Capt. R. C. McLaren, M.B. (241385).
 Capt. T. H. Meek, M.D. (252046).
 Capt. C. Milne, M.B. (118088).
 Capt. J. F. O'Neill, M.B. (282811).
 Capt. (Qr.-Mr.) R. W. Payling (178564).
 Capt. G. W. Pimblett, M.B. (99425).
 Capt. Miss D. P. Potter (263719).
 Capt. E. J. T. Prettejohn, M.B. (294078).
 Capt. D. H. Rhind, M.B. (122045).
 Capt. P. M. Ritchie, M.B. (294678).
 Capt. T. T. Romans, M.B. (287238).
 Capt. Miss O. C. Sandys, M.B. (257673).
 Capt. W. M. Smith (250357).
 Capt. D. N. Stuart, M.B. (301974).
 Capt. J. H. Tasker, M.B. (239812).
 Capt. J. R. Trounce, M.B. (328918).
 Capt. I. McC. Troup, M.B. (322476).
 Capt. (Qr.-Mr.) A. G. W. Turner (225523).
 Capt. H. B. S. Warren (248737).
 Capt. P. F. A. Watkins (306959).
 Capt. C. J. L. Wells, B.M. (51422).
 Capt. W. F. White, M.B. (216215).
 Capt. O. P. G. Whitfield, M.B. (238800).
 Capt. I. A. Williams (279115).
 Capt. W. K. Young, M.B. (123115).
 Capt. (temp.) W. H. Franklin (287586).
 Capt. (temp.) J. Wilson (306485).
 Lt. J. G. S. Burton (287575).
 Lt. F. A. Donnithorne (279862).
 Lt. S. B. Fletcher (287577).
 Lt. (Qr.-Mr.) L. A. J. Hart (279161).
 Lt. K. D. Poulter (294645).
 Lt. W. A. Reynolds (282012).
 Lt. K. L. Taylor (268411).
 Lt. A. H. Tottle (318147).
 Lt. C. Weir (274250).
 Lt. S. J. Windsor (317659).
 7262164 W.O. I. G. K. Brookes.
 7347416 W.O. I. J. F. Cooke.
 7264824 W.O. I. G. W. Gill.
 7344166 W.O. I. J. C. A. Hucker.
 7343170 W.O. I. J. Walker.
 1438366 W.O. I. J. Watt.
 7262239 W.O. I. (actg.) P. Douglas.
 7345623 W.O. I. (actg.) N. W. Purnell.
 7522331 W.O. II G. I. Attwood.
 7347496 W.O. II R. A. Cook.
 7346521 W.O. II A. C. Dow.
 7256293 W.O. II F. H. Fielder.
 7336733 W.O. II W. A. Foyster.
 7260405 W.O. II T. M. Johnson.
 7520255 W.O. II J. H. Northcott.
 7346763 W.O. II L. J. Stead.
 7517886 W.O. II D. A. Thompson.
 7260998 W.O. II F. Walker.
 7259796 W.O. II (actg.) A. J. Reid.
 7518688 W.O. II (actg.) T. H. K. Reynolds.
 7380859 W.O. II (actg.) J. W. Short.
 7359404 W.O. II (actg.) D. H. Taylor.
 7354205 S.-Sergt. S. Allen.
 7259112 S.-Sergt. A. Bennett.
 7522608 S.-Sergt. G. C. Bowie.
 7380209 S.-Sergt. G. W. Britten.
 7517552 S.-Sergt. A. Chesney.
 7354346 S.-Sergt. J. Churchill.
 7361104 S.-Sergt. A. H. Claydon.
 7357599 S.-Sergt. E. W. J. Daldry.

7346184 S.-Sergt. L. C. Godfrey.
 7521587 S.-Sergt. S. F. Hammond.
 7266172 S.-Sergt. R. Hulme.
 7262559 S.-Sergt. J. Mackay.
 7358217 S.-Sergt. W. J. McCord.
 7256915 S.-Sergt. J. McDonald.
 7347556 S.-Sergt. F. J. Nokes.
 7400283 S.-Sergt. W. Outhwaite.
 7383279 S.-Sergt. B. L. Parker.
 7261949 S.-Sergt. E. G. Smart.
 7370312 S.-Sergt. A. Smith.
 7259805 S.-Sergt. N. Steedman.
 7396706 S.-Sergt. T. N. Tolley.
 7381187 S.-Sergt. (actg.) A. E. Carr.
 7522166 S.-Sergt. (actg.) W. J. Reid.
 7349240 Sergt. L. Allen.
 7399387 Sergt. L. W. Ashman.
 7518029 Sergt. T. V. Baggaley.
 7519536 Sergt. F. Batley.
 7263104 Sergt. A. E. A. Bevan.
 7388008 Sergt. S. Broughton.
 14549868 Sergt. J. T. Buchan.
 7369439 Sergt. R. Charlton.
 7356504 Sergt. V. A. Childs.
 7520794 Sergt. G. F. Clegg.
 7522346 Sergt. J. D. Cordingley.
 7536146 Sergt. K. C. Coventry.
 7395306 Sergt. E. J. Crane.
 7518013 Sergt. R. Featherstone.
 7518448 Sergt. D. D. H. C. Ferguson.
 7522872 Sergt. E. Fletcher.
 7403514 Sergt. J. H. Geeson.
 7524234 Sergt. F. E. Griffin.
 7356423 Sergt. J. N. Harley.
 7346789 Sergt. J. G. Imray.
 7357266 Sergt. H. O. Jansen.
 7356736 Sergt. H. T. Leyland.
 7359366 Sergt. M. Mackenzie.
 7266647 Sergt. R. Owen.
 7349900 Sergt. J. D. Porter.
 7260058 Sergt. H. W. E. Ring.
 7347846 Sergt. W. M. Rodger.
 7374968 Sergt. R. C. Shears.
 7365055 Sergt. E. R. Shelley.
 7520988 Sergt. W. Shepherd.
 7356862 Sergt. J. D. Sleigh.
 7522783 Sergt. F. E. Smith.
 1905523 Sergt. M. H. Steeples.
 7346305 Sergt. W. Stewart.
 7517646 Sergt. J. Townend.
 7521846 Sergt. R. C. Wagener.
 3063793 Sergt. W. J. Watt.
 7356072 Sergt. H. Whittaker.
 7372812 Sergt. L. Williams.
 7380451 Sergt. (actg.) A. Allen.
 7347490 Sergt. (actg.) T. A. Hawkins.
 7516300 Sergt. (actg.) A. Manson.
 7395839 Sergt. (actg.) H. W. Williams.
 7266654 Lce.-Sergt. A. T. Phillip.
 7387934 Lce.-Sergt. M. S. D. Warden.
 7358367 Cpl. E. S. Allison.
 7345979 Cpl. A. E. T. Ashwell.
 7519143 Cpl. G. A. Bowman.
 7361810 Cpl. A. Brown.
 7373883 Cpl. H. Ferrie.
 7363398 Cpl. T. P. Graveson.
 7377268 Cpl. G. H. Henderson.
 7358839 Cpl. W. T. Hickman.

14518694 Cpl. J. H. Hudson.
 7380425 Cpl. E. D. Jones.
 7345685 Cpl. J. Miles.
 7364293 Cpl. H. Potter.
 7344989 Cpl. E. R. Read.
 7389469 Cpl. G. J. Reynolds.
 14306588 Cpl. L. J. Reynolds.
 7393315 Cpl. J. C. Smith.
 7383061 Cpl. I. E. T. Thomas.
 7399523 Cpl. A. W. Trippree.
 7400331 Cpl. J. S. Wallace.
 4271098 Cpl. L. J. Walton.
 7263270 Cpl. (actg.) E. A. Dawkins.
 2021309 Lce.-Cpl. A. F. Mitchell.
 14651716 Lce.-Cpl. A. Moggridge.
 7266628 Lce.-Cpl. D. J. Mole.
 14351455 Lce.-Cpl. F. C. Nalder.
 7354496 Lce.-Cpl. A. Palethorpe.
 7377225 Lce.-Cpl. R. C. Sheppard.
 7395016 Lce.-Cpl. H. Taylor.
 7362094 Lce.-Cpl. E. Thornton.
 7382655 Lce.-Cpl. A. Tosh.
 7518150 Lce.-Cpl. W. J. Williams.
 14289024 Lce.-Cpl. L. Wymer.
 14585054 Pte. S. A. Blyth.
 14593767 Pte. W. F. Bowley.
 14321025 Pte. A. E. Broadribb.
 7518755 Pte. F. S. Davies.
 7390857 Pte. F. V. Dook.
 7367702 Pte. J. F. Dring.
 14577377 Pte. W. L. Evans.
 7374361 Pte. J. H. Fletcher.
 7377434 Pte. W. Garbett.
 7366700 Pte. S. F. Henry.
 14512535 Pte. A. H. Hill.
 14528635 Pte. W. Hindle.
 7520440 Pte. H. Hodds.
 7381716 Pte. S. Holmes.
 14241989 Pte. R. W. Hull.
 7371825 Pte. T. A. Hunt.
 7365725 Pte. B. S. H. Jarvis.
 7371163 Pte. W. Johnson.
 7518112 Pte. H. O. Jones.
 7395018 Pte. P. T. Knott.
 3243953 Pte. J. McCormack.
 7516433 Pte. D. H. Millward.
 7366912 Pte. J. Monaghan.
 7357647 Pte. F. S. Mowat.
 6105961 Pte. S. R. Nercombe.
 14651366 Pte. W. H. Player.
 7403724 Pte. A. Pryde.
 14617550 Pte. E. Rule.
 7405041 Pte. S. A. Sheppard.
 7360011 Pte. J. Spoor.
 7375868 Pte. W. A. Teear.
 7519018 Pte. C. C. Tremain.
 7391172 Pte. J. Urquhart.

Army Dental Corps.

Maj. E. C. Irish (41016).
 Maj. (temp.) J. L. Ardern (139319).
 Maj. (temp.) S. H. Brown (123447).
 Maj. (temp.) G. E. M. Hallett (142401).
 Maj. (temp.) F. K. Johnson (71772).
 Maj. (temp.) G. B. Player (93256).
 Maj. (temp.) R. P. Powell (107992).
 Maj. (temp.) A. C. Robertson (135105).
 Maj. (temp.) J. R. P. Thomas (86752).

Capt. G. R. Cogdon (131534).
 Capt. W. J. Duvall (116988).
 Capt. A. H. Herbert (171209).
 Capt. W. J. R. C. Morgan (141167).
 7538439 W.O. II (actg.) L. Hicks.
 7537626 S.-Sergt. K. B. Betts.
 7538142 Sergt. L. Carter.
 7537365 Cpl. G. Roe.

*Queen Alexandra's Imperial Military
 Nursing Service.*

Principal Matron D. L. Underhill, *R.R.C.*
 (206498).
 Principal Matron (actg.) Z. Scott (206438).
 Matron (actg.) K. A. Morrow, *A.R.R.C.*
 (206304).
 Senior Sister (actg.) A. Roberts, *A.R.R.C.*
 (209120).
 Sister D. E. M. Amies (206588).
 Sister V. M. Armstrong (206592).
 Sister J. C. Bowstead (254806).
 Sister E. Eccles (208064).
 Sister K. Evers (209583).
 Sister C. F. Gall (238153).
 Sister J. G. Henderson (208415).
 Sister P. V. Jones (250111).
 Sister M. B. Kneebone (206260).
 Sister D. M. Laight (208704).
 Sister D. J. Leck (208972).
 Sister E. Malone (208740).
 Sister M. G. Mitchell (208852).
 Sister J. Breedon (274760).
 Sister F. L. Davies (213862).
 Sister A. P. Dick (213724).
 Sister J. M. Dove (234381).
 Sister K. W. Emerson (257788).
 Sister D. M. Fryer (208072).
 Sister J. A. Groth (213830).
 Sister M. Hockley (325161).
 Sister M. Jamieson (208561).
 Sister N. W. Kearsey (208579).
 Sister K. Kelly (305115).
 Sister M. E. Manson (270639).
 Sister W. Mole (309482).
 Sister R. Pearce (209640).
 Sister H. J. Read (209151).
 Sister M. Russell (231424).
 Sister F. M. Sands (209205).
 Sister A. K. Stocks (309383).
 Sister E. K. Whittam (238089).
 Sister F. M. Williams (209426).
 Sister B. M. Wilson-Williams (260241).

Territorial Army Nursing Service.

Principal Matron P. E. C. Sharpe, *R.R.C.*
 (215033).
 Sister H. Corban (213001).
 Sister M. O. Ross (215366).
 Sister A. M. Brown (213600).
 Sister M. G. Crawford (213041).
 Sister M. C. Hicks (230222).
 Sister V. G. Hurst (218323).
 Sister E. J. Rotter (215315).
 Sister H. F. Smart (215474).

April 18.

MENTIONED (in the field)

Maj. (actg.) P. A. M. Van De Linde, *M.B.* (227056).
 Capt. R. H. S. Lee, *M.B.E.*, *M.B.* (294961).

MENTIONED (while Prisoners of War)

7346188 Sergt. T. H. Leak.
 7535721 Cpl. V. Nelson.
 7535641 Pte. A. W. Noronha.

April 2.—Col. J. E. Ellcome (10267), late *R.A.M.C.*, retires on ret. pay, Mar. 30, 1946.

Short Service Commn.

Capt. T. A. G. Reed, *M.B.* (123660) is apptd. to a Permanent Commn., Feb. 28, 1945, retaining his present seniority.

Lt. (Qr.-Mr.) (War Subs. Capt. (Qr.-Mr.)) J. F. Ford (227760) to be Capt. (Qr.-Mr.) Apr. 3, 1946.

Lt.-Col. C. A. Whitfield, *M.B.* (15672) having reached the age for retirement, is retained on the Active List (supern.) Mar. 29, 1946.

Maj. D. P. Stevenson (66486) retires Mar. 30, 1946, receives a gratuity, and is granted the hon. rank of Lt.-Col.

Lt.-Col. T. W. Davidson, *M.B.* (26766) retires on ret. pay, Apr. 3, 1946, and is granted the hon. rank of Brig.

April 5.—Maj. L. R. H. Keatinge, *O.B.E.*, *M.B.* (31039), to be Lt.-Col., Mar. 29, 1946.

Maj. J. V. McNally, *M.B.* (5826), having attained the age for retirement, is retained on the Active List (supern.), Feb. 16, 1946.

April 9.—Col. F. R. Laing, *M.B.* (22789), late *R.A.M.C.*, retires on ret. pay, Apr. 9, 1946, and is granted the hon. rank of Brig.

War Subs. Maj. R. J. Niven, *M.C.*, *M.B.* (70118), to be Maj., Apr. 1, 1946.

Lt. (Qr.-Mr.) (War Subs. Capt. (Qr.-Mr.)) E. A. Loft (128140) to be Capt. (Qr.-Mr.), Apr. 8, 1946.

Lt.-Col. H. D. F. Brand (15332) having attained the age for retirement, is retained on the Active List (supern.), Apr. 6, 1946.

Capt. T. O. McKane, *M.B.* (89978), retires, Apr. 9, 1946, and is granted the hon. rank of Maj.

April 12.—Col. (Actg. Maj.-Gen.) S. Arnott, *C.B.E.*, *D.S.O.*, *M.D.* (4215), late *R.A.M.C.*, is granted the temp. rank of Maj.-Gen., Apr. 12, 1946.

Col. R. B. Price, *D.S.O.*, *M.B.* (20701), retires on ret. pay, Apr. 11, 1946, and is granted the hon. rank of Brig.

Lt.-Col. S. O. Dolan (9015) retires on ret. pay, Apr. 11, 1946, and is granted the hon. rank of Col.

Short Service Commns.

War Subs. Capt. Digby William Moynagh, *M.C.*, *M.B.* (157583) from *R.A.M.C.* (Emerg. Commn.) is granted a Short Service Commn. in the rank of Lt., Nov. 21, 1940 and to be Capt., Nov. 21, 1941.

Capt. C. C. Corfield (181477) is appt. to a permanent commn., Apr. 10, 1946, retaining his present seniority.

April 16.—Col. W. D. Arthur, *M.B.E.* (15749), late *R.A.M.C.*, having attained the limit for retirement, is retained on the Active List (supern.), Apr. 7, 1946.

Short Service Comms.

War Subs. Capt. Alastair James Moss-Blundell, M.B. (211583), from R.A.M.C. (Emerg. Commn.) is granted a short service commn. in the rank of Lt., Oct. 18, 1941, and to be Capt., Oct. 18, 1942.

War Subs. Capt. William Geoffrey Canning, M.B. (322863), from R.A.M.C. (Emerg. Commn.) is granted a short service commn. in the rank of Lt., June 24, 1944, and to be Capt., June 24, 1945.

April 19.—Lt.-Col. F. R. H. Mollan, *O.B.E.*, M.C. (5666), from R.A.M.C., to be Col., Apr. 7, 1946, with seniority Oct. 13, 1944.

Col. E. C. Beddows, *O.B.E.*, M.C. (8069), late R.A.M.C., retires on ret. pay, Apr. 19, 1946, and is granted the hon. rank of Brig.

Maj. P. Dwyer, M.B. (39086), to be Lt.-Col., Dec. 19, 1945. (Substituted for the notfn. in *Gazette* (Supplement) dated Feb. 1, 1946.)

Maj. W. H. Scriven (30088) to be Lt.-Col. Jan. 3, 1946. (Substituted for the notfn. in *Gazette* (Supplements) dated Feb. 1 & 15, 1946.)

The undermentioned Maj. to be Lt.-Cols. with seniority as shown :—

Jan. 16, 1946 :—

(War Subs. Lt.-Col.) J. Bennet, M.D., M.R.C.P. (5917) Mar. 25, 1943 next above Lt.-Col. T. L. Henderson (15661).

Feb. 12, 1946 :—

J. Huston (27886), Dec. 12, 1944, (next above Lt.-Col. E. G. Dalziel (24431)).

Feb. 16, 1946 :—

L. R. S. Macfarlane, M.B. (38185), Oct. 29, 1945, next above Lt.-Col. H. A. Ferguson (38182).

Mar. 1, 1946 :—

W. F. Lane, M.B. (38184), Oct. 29, 1945, next above Lt.-Col. H. A. Ferguson (38182), and next below Lt.-Col. L. R. S. Macfarlane (38185).

Jan. 7, 1946 :—

W. A. R. Ross, M.B. (39133).

Jan. 12, 1946 :—

(War Subs. Lt.-Col. H. E. Knott, *O.B.E.*, M.D. (41299).

Mar. 8, 1946 :—

H. W. Daukes (40135).

Apr. 3, 1946 :—

W. D. Hughes, M.D. (40252).

Apr. 6, 1946 :—

R. R. Leaning, *O.B.E.* (41300).

Short Service Comms.

War Subs. Maj. H. M. Upshon (183478) is appt. to a permanent commn., Apr. 17, 1946, retaining his present seniority.

Lt. Richard Andrew (355536) to be Lt., Sept. 8, 1945.

April 26.—Col. K. P. Mackenzie (14221), late R.A.M.C., having attained the age for retirement, is retained on the Active List supern., Apr. 24, 1946.

The undermentioned War Subs. Maj. to be Maj., Apr. 23, 1946 :—

J. Shields (67295). K. H. Harper (67855). R. S. Hunt (70112).

The undermentioned Capt. to be Maj., Apr. 23, 1946 :—

M. F. H. Kelleher, M.C., M.B. (67854).

K. F. Stephens, M.B. (72161).

Short Service Commn.

War Subs. Capt. William Young Laidlaw, M.B. (254116), from R.A.M.C. (Emerg. Commn.), is granted a Short Service Commn. in the rank of Lt., Nov. 21, 1942, and to be Capt., Nov. 21, 1943.

April 30.—Maj. W. G. Harvey (40522) to be Lt.-Col., Apr. 7, 1946.

War Subs. Capt. Henry Foster, M.B. (127633) from R.A.M.C. (Emerg. Commn.), is granted a Short Service Commn. in the rank of Lt., Apr. 1, 1940, and to be Capt. Apr. 1, 1941.

May 3.—Lt.-Col. G. O. F. Alley, M.C., M.D. (14138), from R.A.M.C., to be Col. Apr. 24, 1946, with seniority, Oct. 13, 1944.

Lt.-Col. C. B. C. Anderson, *O.B.E.*, M.B., F.R.C.S. (Edin.) (5755) retires on ret. pay, Dec. 19, 1945, and is granted the hon. rank of Col. (Substituted for the notfn. in *Gazette* (Supplement) dated Mar. 19, 1946.)

Lt.-Col. F. J. O'Meara, M.D., F.R.C.P.(I) (26774) to be Consultant and is granted the local rank of Brig., Apr. 1, 1946.

Maj. (War Subs. Lt.-Col.) W. J. Officer, *O.B.E.*, M.B. (21400), to be Lt.-Col. Apr. 24, 1946.

War Subs. Maj. C. W. Maisey (67299) to be Maj., Apr. 23, 1946.

Lt. (Qr.-Mr.) (War Subs. Capt. (Qr.-Mr.)) Albert William Langley (99208) from Emerg. Commn., to be Lt. (Qr.-Mr.), May 17, 1945.

Lt.-Col. H. Alcock (8847) retires on ret. pay, May 1, 1946, and is granted the hon. rank of Col.

Short Service Commn.

Capt. R. S. McGeorge, M.B. (99322), retires on account of disability, May 1, 1946.

The Army Dental Corps.

April 2.—Gen. Sir Ronald F. Adam, Bt., G.C.B., D.S.O., *O.B.E.* (1632), (Col. Comdt., R.A., Col. Comdt., A.E.C.) is appt. Col. Comdt., Dec. 12, 1945, vice the late Maj.-Gen. D. Clewer, C.B.

The undermentioned Capt. to be Maj., Apr. 1, 1946 :—

D. V. Taylor (67661).

R. Walker (67663).

Short Service Commn.

April 16.

Lt. (War Subs. Capt.) Eric Marcus Babington (161402) from Emerg. Comm. A.D. Corps, to be Lt., Dec. 30, 1940, and to be Capt., Dec. 30, 1941.

Short Service Commn.

April 23.

Capt. K. Howse (125937) is apptd. to a permanent commn., Apr. 16, 1946, retaining his present seniority.

DEATHS.

SWETE-EVANS.—It is with great regret that we announce the death of Lieutenant-Colonel W. B. Swete-Evans, R.A.M.C. He served as a temporary Officer in the War of 1914-1918 as a Surgical Specialist and continued in that capacity at Belfast and Holyrood with the rank of Major. About 12 years ago he was stationed at Catterick Camp as a Surgical Specialist and after the outbreak of the present war was promoted to Lieutenant-Colonel as Officer-in-Charge of Surgical Division. He carried on as Registrar, Catterick Camp, until a year ago when he retired. During his last six months he patiently and courageously suffered from a serious illness which he knew was a losing fight. Many officers will recall his sound judgment, his great sympathy with his patients and his cheerful and humorous disposition. Many of us have lost a real friend and colleague, and our deep sympathy is felt for his wife and daughter, the latter being an officer in the W.R.N.S.

SAUNDERS.—In Surbiton on April 22, 1946, Major Ernest Victor Saunders, *O.B.E.*, R.A.M.C., Retired. Born April 30, 1865, he enlisted in the Army Hospital Corps July 31, 1884, and was commissioned Quartermaster and Hon. Lieut. Sept. 25, 1909. Promoted Captain July 1, 1917, he retired with the rank of Major April 30, 1920. He served in South Africa 1900-1902, taking part in the operations in Cape Colony and Transvaal, and receiving the Queen's Medal with three Clasps and the King's Medal with two Clasps. In 1914-1918 he served in France, Belgium and Italy. Twice mentioned in despatches, he was awarded the *O.B.E.*, and received the 1914 Star, British War and Victory Medals. He was an original member of the R.A.M.C. Association, in which he was very keenly interested. For a time he ran the Aldershot Branch. In his later years, he never missed a meeting of the Central Committee, of which he was a member, even though, as time went on, the strain of coming to town must have been considerable.

EDITORIAL NOTICES.

The Editor will be glad to receive original communications upon professional subjects, travel, personal experiences, etc.

Correspondence on matters of interest to the Corps, and articles of a non-scientific character, may be accepted for publication under a *nom de plume*.

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JOURNAL OF THE ROYAL ARMY MEDICAL CORPS

Corps News.

JUNE, 1946.

FROM "THE LONDON GAZETTE."

HONOURS AND AWARDS.

May 9, 1946.

MENTIONED (Burma)

Brig. (temp.) G. E. Macalevey, *D.S.O.*, *M.C.*

Brig. (temp.) A. N. T. Meneces, *C.B.E.*

Col. (temp.) J. R. Dawson.

Lt.-Col. (temp.) R. H. Baird.

" " P. W. Hannay.

" " I. Harris.

" " M. S. Holman.

" " W. C. Mitchell.

" " C. E. Moorhead.

" " F. H. Morrell.

" " W. O'Callaghan.

" " R. A. Philp.

" " W. Serle.

" " C. S. Smalley, *M.C.*

" " H. G. H. Waters.

" (actg.) G. A. S. Akeroyd.

Maj. J. S. Mackay.

Maj. (temp.) D. Billeg.

" " N. H. Bloom.

" " R. T. Bowes.

" " C. W. P. Bradfield.

" " C. McL. Craig.

" " W. R. McK. Couper.

" " J. A. Farrell (killed in action).

" " W. G. Ferguson.

" " W. Fielding.

" " T. Fitt.

" " L. A. Ives.

" " H. T. Laycock.

" " T. R. Maurice.

" " J. McIntosh.

" " D. S. Milne.

" " H. G. Page.

" " W. W. Park.

" " F. D. F. Steede.

" " F. Stephenson.

" " J. D. Younghusband.

" (actg.) H. A. Daniels.

Capt. W. K. N. Brown.

" R. N. Cates.

" W. H. Chase.

" D. H. Crook.

" R. S. Gibson.

" J. Griffith.

" (Qr.-Mr.) P. Lagrue.

" A. A. Martin.

" G. S. Moore.

" J. J. Phillips.

" G. H. Pimblett.

" M. F. Ronayne.

" H. M. Smallwood.

" W. T. Stone.

" R. L. Witney.

" (temp.) R. Groat.

" (actg.) (Qr.-Mr.) F. Fenwick.

" " " W. J. Teanby.

Lt. (Qr.-Mr.) W. Finney.

" " R. T. Knight.

Lt. R. D. Nicholson.

Lt. N. Slater.

7260400 W.O. I. A. Costello.

7259665 W.O. I (actg.) D. McGregor.

7524100 W.O. II G. R. Battye.

7259345 W.O. II T. Ford.

210776 W.O. II R. Melvin.

7345342 W.O. II D. H. Penny.

7349239 S/Sgt. H. W. Jones.

7523982 S/Sgt. L. B. Littlewood.

7369969 S/Sgt. (actg.) J. A. Comrie.

7379259 Sgt. F. Brown.

7522044 Sgt. B. E. E. Dack.

7366474 Sgt. H. E. Hunt.

7361720 Sgt. F. M. Lawson.

7522636 Sgt. S. A. Mullans.

7357042 Sgt. L. Story.

7367456 Sgt. (actg.) W. H. Vincent.

7390612 Cpl. S. T. Goddard.

805934 Cpl. F. A. Griffin.

7533106 Cpl. R. M. Marsh.

7535381 Cpl. F. R. McMullen.

7533604 Cpl. D. M. R. Ross.

7357841 Cpl. (actg.) J. L. Steen.

7378792 Cpl. (actg.) L. H. Williams.

7398374 Lce.-Cpl. A. Holland.

7397787 Lce.-Cpl. H. J. Walters.

14332686 Pte. E. I. Mansfield.

7362649 Pte. W. D. Thomas.

Army Dental Corps.

Lt.-Col. (temp.) F. J. McCarthy.

Capt. A. Downey.

Capt. R. J. Paiton.

Q.A.I.M.N.S. (R).

Matron (actg.) Mrs. V. W. M. Scott-White.

S. Sister E. E. Bruce.

Sister Mrs. B. M. I. Daniels.

" J. T. Duncan.

" Mrs. E. R. Horn.

" M. Johnson.

" M. Jones.

" M. A. Kay. A.R.R.C.

" Mrs. E. V. Western (*née* Knott).

" D. Machin.

" J. G. McMorrine.

" M. M. McClure.

" Mrs. O. M. Milner.

" M. Moreton.

" J. O'Connor.

" Mrs. J. A. Oram.

" A. Peacock.

" A. M. Raven.

" M. A. Rice.

" E. A. Smith, A.R.R.C.

T.A.C.

Sister H. S. T. Howden

" Mrs. G. L. Moore.

EFFICIENCY DECORATION.

Lt.-Col. (T/Col.) R. H. Robinson.
 Lt.-Col. T. H. Wilson.
 Maj. (T/Lt.-Col.) F. R. Bettley.
 Maj. (T/Lt.-Col.) A. S. L. Malcolm (T.A.R.O.).

May 23.

MENTIONED (Mediterranean Theatre)

Royal Army Medical Corps.

Col. (temp.) G. Anderton, *O.B.E.*, M.B. (36781).
 Col. (temp.) G. T. Garraway (14974).
 Col. (temp.) H. J. R. Thorne, *D.S.O.*, M.B. (51399).
 Lt.-Col. (temp.) F. A. Bevan, *T.D.*, M.B. (40928).
 Lt.-Col. (temp.) H. Bambridge, *T.D.*, M.B. (45373).
 Lt.-Col. (temp.) S. M. Cornes (104032).
 Lt.-Col. (temp.) A. L. D'Abreu, *O.B.E.*, M.B., *F.R.C.S.*, Ch.M. (94581).
 Lt.-Col. (temp.) J. Fleming, M.D., *F.R.F.P.S.* (157732).
 Lt.-Col. (temp.) G. M. Frizell, *T.D.*, M.D. (47891).
 Lt.-Col. (temp.) F. D. Hart, M.D., *M.R.C.P.* (236062).
 Lt.-Col. (temp.) A. G. Johnson (135605).
 Lt.-Col. (temp.) B. R. M. Johnson (159187).
 Lt.-Col. (temp.) J. B. King, M.D., *F.R.C.P.* (223519).
 Lt.-Col. (temp.) A. J. C. Latchmore, *M.B.E.*, M.S., *F.R.C.S.* (87660).
 Lt.-Col. (temp.) W. A. Mill, M.S., *F.R.C.S.* (234733).
 Lt.-Col. (temp.) J. D. W. Pearce, M.D., *F.R.C.P.* (131687).
 Lt.-Col. (temp.) R. W. Raven, *F.R.C.S.* (218890).
 Lt.-Col. (temp.) L. F. W. Salmon, *M.B.E.* (62962).
 Lt.-Col. (temp.) J. R. St. G. Stead, *F.R.C.S.* (122742).
 Lt.-Col. (temp.) A. Watson, M.B., *F.R.C.S.* (171528).
 Lt.-Col. (actg.) J. B. Bishop, M.D. (68480).
 Maj. R. V. Facey, *T.D.*, M.B., *F.R.C.P.* (45023).
 Maj. G. D. Falconer, M.B., *F.R.C.S.* (98998).
 Maj. R. A. P. Gray, M.B. (56258).
 Maj. (temp.) L. C. Beadle (244058).
 Maj. (Qr.-Mr.) (temp.) R. E. Broughton (47820).
 Maj. (temp.) K. Cameron, M.B. (78603).
 Maj. (temp.) A. V. Dickie, M.B. (90015).
 Maj. (temp.) J. A. P. Evans, M.B. (236046).
 Maj. (temp.) D. I. Finer (112033).
 Maj. (temp.) A. Findlay, M.B. (107338).
 Maj. (temp.) R. S. Garden, M.B. (223277).
 Maj. (temp.) A. Gourevitch, *M.C.* (94311).
 Maj. (temp.) J. A. Gordon, M.B. (107670).
 Maj. (temp.) F. C. Hyland, M.B. (171198).
 Maj. (temp.) D. Jefferiss, M.B. (77850).
 Maj. (temp.) H. C. Johnston, M.B. (119751).
 Maj. (temp.) C. D. P. Jones, *M.B.E.*, M.B., *F.R.C.S.* (136634).
 Maj. (temp.) F. Kane, M.B. (205062).
 Maj. (temp.) A. B. Kettle, M.D., *M.R.C.P.* (246763).
 Maj. (temp.) I. Leveson, M.B. (241091).
 Maj. (temp.) J. N. Macartney, *M.B.E.* (131336).
 Maj. (temp.) S. Mackenzie (111761).
 Maj. (temp.) W. Mackenzie, M.B. (93586).

Maj. (temp.) A. A. MacNair, M.B. (139370).
 Maj. (temp.) R. L. Marks, M.B. (89376).
 Maj. (temp.) W. E. Mashiter, M.D. (120189).
 Maj. (temp.) R. G. Miller, M.B. (108722).
 Maj. (temp.) R. Mowbray, M.D., *M.R.C.P.* (96856).
 Maj. (temp.) P. B. L. Muldoon, M.B. (211967).
 Maj. (temp.) A. D. Newsholme (111777).
 Maj. (temp.) J. G. O'Sullivan, M.D. (122369).
 Maj. (temp.) W. A. Owen (101251).
 Maj. (temp.) E. Pereira, M.B. (230078).
 Maj. (temp.) E. H. D. Phillips (163707).
 Maj. (temp.) H. P. Player (250367).
 Maj. (temp.) A. H. M. Richards, M.B. (79644).
 Maj. (temp.) G. I. M. Ross, M.B. (297503).
 Maj. (temp.) M. J. Saunders, M.B. (141041).
 Maj. (temp.) J. A. W. Shearer, M.B. (86037).
 Maj. (temp.) S. B. Smith (218953).
 Maj. (temp.) O. H. Theodor (240849).
 Maj. (temp.) F. L. Turner, M.B. (133966).
 Maj. (temp.) W. M. Walsh, M.B. (128579).
 Maj. (temp.) W. J. Walter, M.B. (106634).
 Maj. (temp.) R. H. Watson, M.B. (246184).
 Maj. (temp.) G. A. Wilson (161272).
 Maj. (temp.) C. L. Worthington, M.B. (239046).
 Maj. (actg.) C. W. A. Falconer, M.B. (230079).
 Maj. (actg.) B. S. C. Gaster, M.B. (139362).
 Maj. (actg.) R. I. McAlley, M.B. (236135).
 Capt. H. Abramovich, *M.C.*, M.B. (126442).
 Capt. J. H. Adams, M.B. (260578).
 Capt. P. B. Angus, M.B. (211575).
 Capt. J. R. Armitage, M.B. (266223).
 Capt. C. L. F. Beaton (216035).
 Capt. W. H. C. Bell (318035).
 Capt. J. H. Bennett, M.B. (239219).
 Capt. O. H. Bostock (221822).
 Capt. J. Brod (227638).
 Capt. T. O. Candler, M.B. (301349).
 Capt. (Qr.-Mr.) W. H. Chadbourne (154207).
 Capt. M. A. Chamberlain, M.B. (107304).
 Capt. (Qr.-Mr.) F. B. Cooper (231129).
 Capt. R. C. Connolly (71528).
 Capt. J. H. Cule (306047).
 Capt. R. B. Davies, M.B. (127191).
 Capt. W. A. J. Donald, M.B. (263437).
 Capt. L. Dornan, M.B. (231708).
 Capt. (Qr.-Mr.) A. F. Down, (231146).
 Capt. J. F. B. Edeson, M.B. (248770).
 Capt. P. K. D. Edmunds (168254).
 Capt. G. Godfrey (227251).
 Capt. C. L. Grandage (230144).
 Capt. J. Halliday, M.B. (202666).
 Capt. J. M. Hilditch, M.B. (246329).
 Capt. J. R. Horn, M.B. (225935).
 Capt. D. R. Hughes (248188).
 Capt. F. G. Hunter (181489).
 Capt. P. E. Jackson, M.B. (328907).
 Capt. (Qr.-Mr.) B. N. Jeffery (181836).
 Capt. D. Klein (317647).
 Capt. M. Knowles, M.B. (322029).
 Capt. R. A. Lambourne, M.B. (230448).
 Capt. R. W. Lush, M.B. (133492).
 Capt. H. N. Mansfield, M.B. (246973).
 Capt. C. R. McClure (119915).
 Capt. R. McInroy, M.B. (239229).
 Capt. (Qr.-Mr.) H. A. Mullington (221701).
 Capt. J. M. Munden (248195).
 Capt. H. B. M. Murphy, M.B. (128574).
 Capt. D. F. Nicholson, M.B. (252543).
 Capt. D. A. O'Sullivan, M.B. (257496).

Capt. R. T. Parkin, M.B. (287889).
 Capt. G. H. Parkinson, M.B. (246811).
 Capt. I. M. Sievers (294895).
 Capt. P. S. Steen (266564).
 Capt. W. R. McL. Stevenson, M.B. (244050).
 Capt. J. H. Stranger, M.B. (248125).
 Capt. B. S. Tulloch, M.B. (119929).
 Capt. J. P. Turney, M.B. (246781).
 Capt. C. P. Wallace, M.B. (244203).
 Capt. R. Watson, M.B. (128687).
 Capt. D. Weitzman, M.B. (297509).
 Capt. M. H. West (250601).
 Capt. T. K. Whaley (329848).
 Capt. P. J. White, M.B. (191098).
 Capt. W. W. Willson (114770).
 Capt. (Qr.-Mr.) (temp.) A. W. J. Cooper
 (279495).
 Capt. (temp.) L. H. Moore (317423).
 Lt. H. Baker (297418).
 Lt. (Qr.-Mr.) F. J. Bird (246554).
 Lt. (Qr.-Mr.) E. A. Creed (239172).
 Lt. R. Frankham (329805).
 Lt. (Qr.-Mr.) G. H. W. Garner (309008).
 Lt. W. A. Reynolds (317653).
 Lt. (Qr.-Mr.) R. M. Wren (221631).
 7516344 W.O. I A. H. Bunston.
 7357931 W.O. I A. S. Carpenter.
 7369927 W.O. I D. W. Forsyth.
 7516611 W.O. I G. Gamble.
 7259886 W.O. I W. P. Johnson.
 7260273 W.O. I G. J. Lynch.
 7340442 W.O. I W. Street.
 7518177 W.O. I (actg.) E. J. W. Daniels.
 7346701 W.O. I (actg.) J. H. Savidge.
 7260557 W.O. II W. A. Curry.
 7523116 W.O. II L. Dowson.
 7259035 W.O. II E. L. Guilfoyle.
 7266320 W.O. II T. Robb.
 7358796 W.O. II R. Robertson.
 7348716 W.O. II C. A. Rockhill.
 7349135 W.O. II A. J. Smith.
 7259416 W.O. II R. N. Stephenson.
 7358121 W.O. II P. J. Suter.
 7349818 W.O. II (actg.) R. R. Hardware.
 7363442 W.O. II (actg.) K. J. Warren.
 7524161 S.-Sgt. H. A. Aldington.
 7347983 S.-Sgt. J. F. C. Allchurch.
 7345142 S.-Sgt. E. H. Bonner, M.M.
 7374511 S.-Sgt. J. T. Boyce.
 7368289 S.-Sgt. F. Coates.
 7516548 S.-Sgt. A. Craddock.
 7263438 S.-Sgt. G. Dyce.
 7348297 S.-Sgt. T. H. Fletcher.
 7357073 S.-Sgt. C. N. Halford.
 7386846 S.-Sgt. G. F. W. Hart.
 7348823 S.-Sgt. R. Ineson.
 7358740 S.-Sgt. J. E. Jayes.
 7516164 S.-Sgt. D. T. Lewis.
 7262347 S.-Sgt. G. K. Smith.
 7354947 S.-Sgt. H. Smith.
 7346582 S.-Sgt. C. R. L. Tebbit.
 7520410 S.-Sgt. K. J. Wilding.
 7354284 S.-Sgt. (actg.) H. E. Buckell.
 7517532 Sgt. J. H. Barnes.
 7519248 Sgt. F. G. Baur.
 7385859 Sgt. A. G. C. Bingham.
 7377419 Sgt. A. Bowater.
 7349647 Sgt. E. H. Box.
 7262806 Sgt. H. J. Callaghan.
 7380294 Sgt. C. Colley.
 7380082 Sgt. L. Day.
 7348480 Sgt. R. F. Dewdney.
 7264371 Sgt. T. H. Everett.
 7345493 Sgt. S. J. Giddy.
 7366766 Sgt. A. Grieg.
 7376198 Sgt. C. W. Hilliard.
 7371826 Sgt. H. G. Hobden.
 7358021 Sgt. R. Hodgson.
 6711927 Sgt. G. Holland.
 7348660 Sgt. N. Hughes.
 7375644 Sgt. W. J. Hughes.
 7349571 Sgt. H. T. Hunt.
 7264491 Sgt. M. Kirkwood.
 7357361 Sgt. B. Lee.
 7388967 Sgt. W. B. Loan.
 7518067 Sgt. E. B. McBeath.
 7339493 Sgt. G. Neil.
 7258534 Sgt. J. E. Nightingale.
 7383642 Sgt. A. Oakley.
 7359890 Sgt. D. Preston.
 7375623 Sgt. B. Ramsden.
 7382063 Sgt. L. Reynolds.
 7384407 Sgt. R. E. Sheppard.
 2652609 Sgt. H. Sherwin.
 7381679 Sgt. W. M. Snook.
 7535248 Sgt. N. V. Stuart.
 7261894 Sgt. J. Tew.
 7354598 Sgt. C. W. P. Ventress.
 7517665 Sgt. G. E. Webb.
 7369739 Sgt. J. White.
 7519840 Sgt. J. F. Wilkins.
 7354610 Sgt. H. Williams.
 7517150 Sgt. W. G. Williams.
 7523866 Sgt. E. S. Windwood.
 7516798 Sgt. W. Wright.
 7263847 Sgt. (actg.) H. Knight.
 7385015 Lce.-Sgt. R. Hunter.
 7522371 Lce.-Sgt. S. Hyde.
 7266548 Lce.-Sgt. H. Inman.
 7349349 Lce.-Sgt. R. Lorrimer.
 7522299 Lce.-Sgt. J. P. W. Philp.
 7389735 Lce.-Sgt. H. Stirzaker.
 7516342 Cpl. W. T. Amphlett.
 7357831 Cpl. E. W. Barlow.
 7348360 Cpl. H. Boardman.
 7382528 Cpl. J. W. Brown.
 7389821 Cpl. M. T. Clarey.
 7519924 Cpl. F. Cole.
 6921842 Cpl. E. Cox.
 7386489 Cpl. R. Crawford.
 7375524 Cpl. J. R. Cumming.
 7395678 Cpl. N. C. Davies.
 7354721 Cpl. T. E. Davies.
 7359749 Cpl. K. H. Davis.
 7395596 Cpl. K. Doe.
 7391828 Cpl. W. Dunlop.
 1454465 Cpl. C. Gibson.
 7386970 Cpl. E. D. Green.
 7266130 Cpl. M. L. Green.
 7395326 Cpl. G. C. Harris.
 7370756 Cpl. J. A. Highwood.
 7364731 Cpl. D. F. Jones.
 7359077 Cpl. B. Larkin.
 7344626 Cpl. C. T. Leather.
 7535164 Cpl. A. Ling.
 7383622 Cpl. H. Lowe.
 7377412 Cpl. J. D. G. Matthews.
 7360630 Cpl. S. G. Matthews.
 7376159 Cpl. H. E. Phipps.
 4115101 Cpl. F. Richmond.

7346184 S.-Sergt. L. C. Godfrey.
 7521587 S.-Sergt. S. F. Hammond.
 7266172 S.-Sergt. R. Hulme.
 7262559 S.-Sergt. J. Mackay.
 7358217 S.-Sergt. W. J. McCord.
 7256915 S.-Sergt. J. McDonald.
 7347556 S.-Sergt. F. J. Nokes.
 7400283 S.-Sergt. W. Outhwaite.
 7383279 S.-Sergt. B. L. Parker.
 7261949 S.-Sergt. E. G. Smart.
 7370312 S.-Sergt. A. Smith.
 7259805 S.-Sergt. N. Steedman.
 7396706 S.-Sergt. T. N. Tolley.
 7381187 S.-Sergt. (actg.) A. E. Carr.
 7522166 S.-Sergt. (actg.) W. J. Reid.
 7349240 Sergt. L. Allen.
 7399387 Sergt. L. W. Ashman.
 7518029 Sergt. T. V. Baggaley.
 7519536 Sergt. F. Batley.
 7263104 Sergt. A. E. A. Bevan.
 7388008 Sergt. S. Broughton.
 14549868 Sergt. J. T. Buchan.
 7369439 Sergt. R. Charlton.
 7356504 Sergt. V. A. Childs.
 7520794 Sergt. G. F. Clegg.
 7522346 Sergt. J. D. Cordingley.
 7536146 Sergt. K. C. Coventry.
 7395306 Sergt. E. J. Crane.
 7518013 Sergt. R. Featherstone.
 7518448 Sergt. D. D. H. C. Ferguson.
 7522872 Sergt. E. Fletcher.
 7403514 Sergt. J. H. Geeson.
 7524234 Sergt. F. E. Griffin.
 7356423 Sergt. J. N. Harley.
 7346789 Sergt. J. G. Imray.
 7357266 Sergt. H. O. Jansen.
 7356736 Sergt. H. T. Leyland.
 7359366 Sergt. M. Mackenzie.
 7266647 Sergt. R. Owen.
 7349900 Sergt. J. D. Porter.
 7260058 Sergt. H. W. E. Ring.
 7347846 Sergt. W. M. Rodger.
 7374968 Sergt. R. C. Shears.
 7365055 Sergt. E. R. Shelley.
 7520988 Sergt. W. Shepherd.
 7356862 Sergt. J. D. Sleigh.
 7522783 Sergt. F. E. Smith.
 1905523 Sergt. M. H. Steeples.
 7346305 Sergt. W. Stewart.
 7517646 Sergt. J. Townend.
 7521846 Sergt. R. C. Wagener.
 3063793 Sergt. W. J. Watt.
 7356072 Sergt. H. Whittaker.
 7372812 Sergt. L. Williams.
 7380451 Sergt. (actg.) A. Allen.
 7347490 Sergt. (actg.) T. A. Hawkins.
 7516300 Sergt. (actg.) A. Manson.
 7395839 Sergt. (actg.) H. W. Williams.
 7266654 Lce.-Sergt. A. T. Phillip.
 7387934 Lce.-Sergt. M. S. D. Warden.
 7358367 Cpl. E. S. Allison.
 7345979 Cpl. A. E. T. Ashwell.
 7519143 Cpl. G. A. Bowman.
 7361810 Cpl. A. Brown.
 7373883 Cpl. H. Ferrie.
 7363398 Cpl. T. P. Graveson.
 7377268 Cpl. G. H. Henderson.
 7358839 Cpl. W. T. Hickman.

14518694 Cpl. J. H. Hudson.
 7380425 Cpl. E. D. Jones.
 7345685 Cpl. J. Miles.
 7364293 Cpl. H. Potter.
 7344989 Cpl. E. R. Read.
 7389469 Cpl. G. J. Reynolds.
 14306588 Cpl. L. J. Reynolds.
 7393315 Cpl. J. C. Smith.
 7383061 Cpl. I. E. T. Thomas.
 7399523 Cpl. A. W. Trippree.
 7400331 Cpl. J. S. Wallace.
 4271098 Cpl. L. J. Walton.
 7263270 Cpl. (actg.) E. A. Dawkins.
 2021309 Lce.-Cpl. A. F. Mitchell.
 14651716 Lce.-Cpl. A. Moggridge.
 7266628 Lce.-Cpl. D. J. Mole.
 14351455 Lce.-Cpl. F. C. Nalder.
 7354496 Lce.-Cpl. A. Palethorpe.
 7377225 Lce.-Cpl. R. C. Sheppard.
 7395016 Lce.-Cpl. H. Taylor.
 7362094 Lce.-Cpl. E. Thornton.
 7382655 Lce.-Cpl. A. Tosh.
 7518150 Lce.-Cpl. W. J. Williams.
 14289024 Lce.-Cpl. L. Wymer.
 14585054 Pte. S. A. Blyth.
 14593767 Pte. W. F. Bowley.
 14321025 Pte. A. E. Broadribb.
 7518755 Pte. F. S. Davies.
 7390857 Pte. F. V. Dook.
 7367702 Pte. J. F. Dring.
 14577377 Pte. W. L. Evans.
 7374361 Pte. J. H. Fletcher.
 7377434 Pte. W. Garbett.
 7366700 Pte. S. F. Henry.
 14512535 Pte. A. H. Hill.
 14528635 Pte. W. Hindle.
 7520440 Pte. H. Hodds.
 7381716 Pte. S. Holmes.
 14241989 Pte. R. W. Hull.
 7371825 Pte. T. A. Hunt.
 7365725 Pte. B. S. H. Jarvis.
 7371163 Pte. W. Johnson.
 7518112 Pte. H. O. Jones.
 7395018 Pte. P. T. Knott.
 3243953 Pte. J. McCormack.
 7516433 Pte. D. H. Millward.
 7366912 Pte. J. Monaghan.
 7357647 Pte. F. S. Mowat.
 6105961 Pte. S. R. Nercombe.
 14651366 Pte. W. H. Player.
 7403724 Pte. A. Pryde.
 14617550 Pte. E. Rule.
 7405041 Pte. S. A. Sheppard.
 7360011 Pte. J. Spoor.
 7375868 Pte. W. A. Teear.
 7519018 Pte. C. C. Tremain.
 7391172 Pte. J. Urquhart.

Army Dental Corps.

Maj. E. C. Irish (41016).
 Maj. (temp.) J. L. Arden (139319).
 Maj. (temp.) S. H. Brown (123447).
 Maj. (temp.) G. E. M. Hallett (142401).
 Maj. (temp.) F. K. Johnson (71772).
 Maj. (temp.) G. B. Player (93256).
 Maj. (temp.) R. P. Powell (107992).
 Maj. (temp.) A. C. Robertson (135105).
 Maj. (temp.) J. R. P. Thomas (86752).

Capt. G. R. Cogdon (131534).
 Capt. W. J. Duvall (116988).
 Capt. A. H. Herbert (171209).
 Capt. W. J. R. C. Morgan (141167).
 7538439 W.O. II (actg.) L. Hicks.
 7537626 S.-Sergt. K. B. Betts.
 7538142 Sergt. L. Carter.
 7537365 Cpl. G. Roe.

*Queen Alexandra's Imperial Military
 Nursing Service.*

Principal Matron D. L. Underhill, *R.R.C.*
 (206498).
 Principal Matron (actg.) Z. Scott (206438).
 Matron (actg.) K. A. Morrow, *A.R.R.C.*
 (206304).
 Senior Sister (actg.) A. Roberts, *A.R.R.C.*
 (209120).
 Sister D. E. M. Amies (206588).
 Sister V. M. Armstrong (206592).
 Sister J. C. Bowstead (254806).
 Sister E. Eccles (208064).
 Sister K. Evers (209583).
 Sister C. F. Gall (238153).
 Sister J. G. Henderson (208415).
 Sister P. V. Jones (250111).
 Sister M. B. Kneebone (206260).
 Sister D. M. Laight (208704).
 Sister D. J. Leck (208972).
 Sister E. Malone (208740).
 Sister M. G. Mitchell (208852).
 Sister J. Breendon (274760).
 Sister F. L. Davies (213862).
 Sister A. P. Dick (313724).
 Sister J. M. Dove (234381).
 Sister K. W. Emerson (257788).
 Sister D. M. Fryer (208072).
 Sister J. A. Groth (313830).
 Sister M. Hockley (325161).
 Sister M. Jamieson (208561).
 Sister N. W. Kearsey (208579).
 Sister K. Kelly (305115).
 Sister M. E. Manson (270639).
 Sister W. Mole (309482).
 Sister R. Pearce (209640).
 Sister H. J. Read (209151).
 Sister M. Russell (231424).
 Sister F. M. Sands (209205).
 Sister A. K. Stocks (309383).
 Sister E. K. Whittam (238089).
 Sister F. M. Williams (209426).
 Sister B. M. Wilson-Williams (260241).

Territorial Army Nursing Service.

Principal Matron P. E. C. Sharpe, *R.R.C.*
 (215033).
 Sister H. Corban (213001).
 Sister M. O. Ross (215366).
 Sister A. M. Brown (213600).
 Sister M. G. Crawford (213041).
 Sister M. C. Hicks (230222).
 Sister V. G. Hurst (218323).
 Sister E. J. Rotter (215315).
 Sister H. F. Smart (215474).

April 18.

MENTIONED (in the field)

Maj. (actg.) P. A. M. Van De Linde, *M.B.* (227056).
 Capt. R. H. S. Lee, *M.B.E.*, *M.B.* (294961).

MENTIONED (while Prisoners of War)

7346188 Sergt. T. H. Leak.
 7535721 Cpl. V. Nelson.
 7535641 Pte. A. W. Noronha.

April 2.—Col. J. E. Ellcome (10267), late *R.A.M.C.*, retires on ret. pay, Mar. 30, 1946.

Short Service Commn.

Capt. T. A. G. Reed, *M.B.* (123660) is apptd. to a Permanent Commn., Feb. 28, 1945, retaining his present seniority.

Lt. (Qr.-Mr.) (War Subs. Capt. (Qr.-Mr.)) J. F. Ford (127760) to be Capt. (Qr.-Mr.) Apr. 3, 1946.

Lt.-Col. C. A. Whitfield, *M.B.* (15672) having reached the age for retirement, is retained on the Active List (supern.) Mar. 29, 1946.

Maj. D. P. Stevenson (66486) retires Mar. 30, 1946, receives a gratuity, and is granted the hon. rank of Lt.-Col.

Lt.-Col. T. W. Davidson, *M.B.* (26766) retires on ret. pay, Apr. 3, 1946, and is granted the hon. rank of Brig.

April 5.—Maj. L. R. H. Keatinge, *O.B.E.*, *M.B.* (31039), to be Lt.-Col., Mar. 29, 1946.

Maj. J. V. McNally, *M.B.* (5826), having attained the age for retirement, is retained on the Active List (supern.), Feb. 16, 1946.

April 9.—Col. F. R. Laing, *M.B.* (22789), late *R.A.M.C.*, retires on ret. pay, Apr. 9, 1946, and is granted the hon. rank of Brig.

War Subs. Maj. R. J. Niven, *M.C.*, *M.B.* (70118), to be Maj., Apr. 1, 1946.

Lt. (Qr.-Mr.) (War Subs. Capt. (Qr.-Mr.)) E. A. Loft (128140) to be Capt. (Qr.-Mr.), Apr. 8, 1946.

Lt.-Col. H. D. F. Brand (15332) having attained the age for retirement, is retained on the Active List (supern.), Apr. 6, 1946.

Capt. T. O. McKane, *M.B.* (89978), retires, Apr. 9, 1946, and is granted the hon. rank of Maj.

April 12.—Col. (Actg. Maj.-Gen.) S. Arnott, *C.B.E.*, *D.S.O.*, *M.D.* (4215), late *R.A.M.C.*, is granted the temp. rank of Maj.-Gen., Apr. 12, 1946.

Col. R. B. Price, *D.S.O.*, *M.B.* (20701), retires on ret. pay, Apr. 11, 1946, and is granted the hon. rank of Brig.

Lt.-Col. S. O. Dolan (9015) retires on ret. pay, Apr. 11, 1946, and is granted the hon. rank of Col.

Short Service Commns.

War Subs. Capt. Digby William Moynagh, *M.C.*, *M.B.* (157583) from *R.A.M.C.* (Emerg. Commn.) is granted a Short Service Commn. in the rank of Lt., Nov. 21, 1940 and to be Capt., Nov. 21, 1941.

Capt. C. C. Corfield (181477) is appt. to a permanent commn., Apr. 10, 1946, retaining his present seniority.

April 16.—Col. W. D. Arthur, *M.B.E.* (15749), late *R.A.M.C.*, having attained the age limit for retirement, is retained on the Active List (supern.), Apr. 7, 1946.

Short Service Commns.

War Subs. Capt. Alastair James Moss-Blundell, M.B. (211583), from R.A.M.C. (Emerg. Commn.) is granted a short service commn. in the rank of Lt., Oct. 18, 1941, and to be Capt., Oct. 18, 1942.

War Subs. Capt. William Geoffrey Canning, M.B. (322863), from R.A.M.C. (Emerg. Commn.) is granted a short service commn. in the rank of Lt., June 24, 1944, and to be Capt., June 24, 1945.

April 19.—Lt.-Col. F. R. H. Mollan, O.B.E., M.C. (5666), from R.A.M.C., to be Col., Apr. 7, 1946, with seniority Oct. 13, 1944.

Col. E. C. Beddows, O.B.E., M.C. (8069), late R.A.M.C., retires on ret. pay, Apr. 19, 1946, and is granted the hon. rank of Brig.

Maj. P. Dwyer, M.B. (39086), to be Lt.-Col., Dec. 19, 1945. (Substituted for the notifi. in *Gazette* (Supplement) dated Feb. 1, 1946.)

Maj. W. H. Scriven (30088) to be Lt.-Col. Jan. 3, 1946. (Substituted for the notifi. in *Gazette* (Supplements) dated Feb. 1 & 15, 1946.)

The undermentioned Maj.s. to be Lt.-Cols. with seniority as shown :—

Jan. 16, 1946 :—

(War Subs. Lt.-Col.) J. Bennet, M.D., M.R.C.P. (5917) Mar. 25, 1943 next above Lt.-Col. T. L. Henderson (15661).

Feb. 12, 1946 :—

J. Huston (27886), Dec. 12, 1944, (next above Lt.-Col. E. G. Dalziel (24431)).

Feb. 16, 1946 :—

L. R. S. Macfarlane, M.B. (38185), Oct. 29, 1945, next above Lt.-Col. H. A. Ferguson (38182).

Mar. 1, 1946 :—

W. F. Lane, M.B. (38184), Oct. 29, 1945, next above Lt.-Col. H. A. Ferguson (38182), and next below Lt.-Col. L. R. S. Macfarlane (38185).

Jan. 7, 1946 :—

W. A. R. Ross, M.B. (39133).

Jan. 12, 1946 :—

(War Subs. Lt.-Col. H. E. Knott, O.B.E., M.D. (41299)).

Mar. 8, 1946 :—

H. W. Daukes (40135).

Apr. 3, 1946 :—

W. D. Hughes, M.D. (40252).

Apr. 6, 1946 :—

R. R. Leaning, O.B.E. (41300).

Short Service Commns.

War Subs. Maj. H. M. Upshon (183478) is appt. to a permanent commn., Apr. 17, 1946, retaining his present seniority.

Lt. Richard Andrew (355536) to be Lt., Sept. 8, 1945.

April 26.—Col. K. P. Mackenzie (14221), late R.A.M.C., having attained the age for retirement, is retained on the Active List supern., Apr. 24, 1946.

The undermentioned War Subs. Maj.s. to be Maj.s., Apr. 23, 1946 :—

J. Shields (67295). K. H. Harper (67855). R. S. Hunt (70112).

The undermentioned Capt.s. to be Maj.s., Apr. 23, 1946 :—

M. F. H. Kelleher, M.C., M.B. (67854).

K. F. Stephens, M.B. (72161).

Short Service Commn.

War Subs. Capt. William Young Laidlaw, M.B. (254116), from R.A.M.C. (Emerg. Commn.), is granted a Short Service Commn. in the rank of Lt., Nov. 21, 1942, and to be Capt., Nov. 21, 1943.

April 30.—Maj. W. G. Harvey (40522) to be Lt.-Col., Apr. 7, 1946.

War Subs. Capt. Henry Foster, M.B. (127633) from R.A.M.C. (Emerg. Commn.), is granted a Short Service Commn. in the rank of Lt., Apr. 1, 1940, and to be Capt. Apr. 1, 1941.

May 3.—Lt.-Col. G. O. F. Alley, M.C., M.D. (14138), from R.A.M.C., to be Col. Apr. 24, 1946, with seniority, Oct. 13, 1944.

Lt.-Col. C. B. C. Anderson, O.B.E., M.B., F.R.C.S. (Edin.) (5755) retires on ret. pay, Dec. 19, 1945, and is granted the hon. rank of Col. (Substituted for the notifi. in *Gazette* (Supplement) dated Mar. 19, 1946.)

Lt.-Col. F. J. O'Meara, M.D., F.R.C.P.(I) (26774) to be Consultant and is granted the local rank of Brig., Apr. 1, 1946.

Maj. (War Subs. Lt.-Col.) W. J. Officer, O.B.E., M.B. (21400), to be Lt.-Col. Apr. 24, 1946.

War Subs. Maj. C. W. Maisey (67299) to be Maj., Apr. 23, 1946.

Lt. (Qr.-Mr.) (War Subs. Capt. (Qr.-Mr.)) Albert William Langley (99208) from Emerg. Commn., to be Lt. (Qr.-Mr.), May 17, 1945.

Lt.-Col. H. Alcock (8847) retires on ret. pay, May 1, 1946, and is granted the hon. rank of Col.

Short Service Commn.

Capt. R. S. McGeorge, M.B. (99322), retires on account of disability, May 1, 1946.

The Army Dental Corps.

April 2.—Gen. Sir Ronald F. Adam, Bt., G.C.B., D.S.O., O.B.E. (1632), (Col. Comdt., R.A., Col. Comdt., A.E.C.) is appt. Col. Comdt., Dec. 12, 1945, vice the late Maj.-Gen. D. Clewer, C.B.

The undermentioned Capt.s. to be Maj.s., Apr. 1, 1946 :—

D. V. Taylor (67661).

R. Walker (67663).

Short Service Commn.

April 16.

Lt. (War Subs. Capt.) Eric Marcus Babington (161402) from Emerg. Comm. A.D. Corps, to be Lt., Dec. 30, 1940, and to be Capt., Dec. 30, 1941.

Short Service Commn.

April 23.

Capt. K. Howse (125937) is apptd. to a permanent commn., Apr. 16, 1946, retaining his present seniority.

DEATHS.

SWETE-EVANS.—It is with great regret that we announce the death of Lieutenant-Colonel W. B. Swete-Evans, R.A.M.C. He served as a temporary Officer in the War of 1914-1918 as a Surgical Specialist and continued in that capacity at Belfast and Holyrood with the rank of Major. About 12 years ago he was stationed at Catterick Camp as a Surgical Specialist and after the outbreak of the present war was promoted to Lieutenant-Colonel as Officer-in-Charge of Surgical Division. He carried on as Registrar, Catterick Camp, until a year ago when he retired. During his last six months he patiently and courageously suffered from a serious illness which he knew was a losing fight. Many officers will recall his sound judgment, his great sympathy with his patients and his cheerful and humorous disposition. Many of us have lost a real friend and colleague, and our deep sympathy is felt for his wife and daughter, the latter being an officer in the W.R.N.S.

SAUNDERS.—In Surbiton on April 22, 1946, Major Ernest Victor Saunders, *O.B.E.*, *R.A.M.C.*, Retired. Born April 30, 1865, he enlisted in the Army Hospital Corps July 31, 1884, and was commissioned Quartermaster and Hon. Lieut. Sept. 25, 1909. Promoted Captain July 1, 1917, he retired with the rank of Major April 30, 1920. He served in South Africa 1900-1902, taking part in the operations in Cape Colony and Transvaal, and receiving the Queen's Medal with three Clasps and the King's Medal with two Clasps. In 1914-1918 he served in France, Belgium and Italy. Twice mentioned in despatches, he was awarded the *O.B.E.*, and received the 1914 Star, British War and Victory Medals. He was an original member of the *R.A.M.C.* Association, in which he was very keenly interested. For a time he ran the Aldershot Branch. In his later years, he never missed a meeting of the Central Committee, of which he was a member, even though, as time went on, the strain of coming to town must have been considerable.

EDITORIAL NOTICES.

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JOURNAL

OF THE

ROYAL ARMY MEDICAL CORPS

Corps News.

JUNE, 1946.

FROM "THE LONDON GAZETTE."

HONOURS AND AWARDS.

May 9, 1946.

MENTIONED (Burma)

Brig. (temp.) G. E. Macalevey, *D.S.O., M.C.*

Brig. (temp.) A. N. T. Meneces, *C.B.E.*

Col. (temp.) J. R. Dawson.

Lt.-Col. (temp.) R. H. Baird.

" " P. W. Hannay.

" " I. Harris.

" " M. S. Holman.

" " W. C. Mitchell.

" " C. E. Moorhead.

" " F. H. Morrell.

" " W. O'Callaghan.

" " R. A. Philp.

" " W. Serle.

" " C. S. Smalley, *M.C.*

" " H. G. H. Waters.

" (actg.) G. A. S. Akeroyd.

Maj. J. S. Mackay.

Maj. (temp.) D. Billeg.

" " N. H. Bloom.

" " R. T. Bowes.

" " C. W. P. Bradfield.

" " C. McL. Craig.

" " W. R. McK. Couper.

" " J. A. Farrell (killed in action).

" " W. G. Ferguson.

" " W. Fielding.

" " T. Fitt.

" " L. A. Ives.

" " H. T. Laycock.

" " T. R. Maurice.

" " J. McIntosh.

" " D. S. Milne.

" " H. G. Page.

" " W. W. Park.

" " F. D. F. Steede.

" " F. Stephenson.

" " J. D. Younghusband.

" (actg.) H. A. Daniels.

Capt. W. K. N. Brown.

" R. N. Cates.

" W. H. Chase.

" D. H. Crook.

" R. S. Gibson.

" J. Griffith.

" (Qr.-Mr.) P. Lagrue.

" A. A. Martin.

" G. S. Moore.

" J. J. Phillips.

" G. H. Pimblett.

" M. F. Ronayne.

" H. M. Smallwood.

" W. T. Stone.

" R. L. Witney.

" (temp.) R. Groat.

" (actg.) (Qr.-Mr.) F. Fenwick.

" " " W. J. Teanby.

Lt. (Qr.-Mr.) W. Finney.

" " R. T. Knight.

Lt. R. D. Nicholson.

Lt. N. Slater.

7260400 W.O. I. A. Costello.

7259665 W.O. I (actg.) D. McGregor.

7524100 W.O. II G. R. Battye.

7259345 W.O. II T. Ford.

210776 W.O. II R. Melvin.

7345342 W.O. II D. H. Penny.

7349239 S/Sgt. H. W. Jones.

7523982 S/Sgt. L. B. Littlewood.

7369969 S/Sgt. (actg.) J. A. Comrie.

7379259 Sgt. F. Brown.

7522044 Sgt. B. E. E. Dack.

7366474 Sgt. H. E. Hunt.

7361720 Sgt. F. M. Lawson.

7522636 Sgt. S. A. Mullans.

7357042 Sgt. L. Story.

7367456 Sgt. (actg.) W. H. Vincent.

7390612 Cpl. S. T. Goddard.

805934 Cpl. F. A. Griffin.

7533106 Cpl. R. M. Marsh.

7535381 Cpl. F. R. McMullen.

7533604 Cpl. D. M. R. Ross.

7357841 Cpl. (actg.) J. L. Steen.

7378792 Cpl. (actg.) L. H. Williams.

7398374 Lce.-Cpl. A. Holland.

7397787 Lce.-Cpl. H. J. Walters.

14332686 Pte. E. I. Mansfield.

7362649 Pte. W. D. Thomas.

Army Dental Corps.

Lt.-Col. (temp.) F. J. McCarthy.

Capt. A. Downey.

Capt. R. J. Paiton.

Q.A.I.M.N.S. (R).

Matron (actg.) Mrs. V. W. M. Scott-White.

S. Sister E. E. Bruce.

Sister Mrs. B. M. I. Daniels.

" J. T. Duncan.

" Mrs. E. R. Horn.

" M. Johnson.

" M. Jones.

" M. A. Kay. A.R.R.C.

" Mrs. E. V. Western (*née* Knott).

" D. Machin.

" J. G. McMorine.

" M. M. McClure.

" Mrs. O. M. Milner.

" M. Moreton.

" J. O'Connor.

" Mrs. J. A. Oram.

" A. Peacock.

" A. M. Raven.

" M. A. Rice.

" E. A. Smith, A.R.R.C.

T.A.N.S.

Sister H. S. T. Howden.

" Mrs. G. L. Moore.

EFFICIENCY DECORATION.

Lt.-Col. (T/Col.) R. H. Robinson.
 Lt.-Col. T. H. Wilson.
 Maj. (T/Lt.-Col.) F. R. Bettley.
 Maj. (T/Lt.-Col.) A. S. L. Malcolm (T.A.R.O.).

May 23.

MENTIONED (Mediterranean Theatre)

Royal Army Medical Corps.

Col. (temp.) G. Anderton, *O.B.E.*, M.B. (36781).
 Col. (temp.) G. T. Garraway (14974).
 Col. (temp.) H. J. R. Thorne, *D.S.O.*, M.B. (51399).
 Lt.-Col. (temp.) F. A. Bevan, *T.D.*, M.B. (40928).
 Lt.-Col. (temp.) H. Bambridge, *T.D.*, M.B. (45373).
 Lt.-Col. (temp.) S. M. Cornes (104032).
 Lt.-Col. (temp.) A. L. D'Abreu, *O.B.E.*, M.B., *F.R.C.S.*, Ch.M. (94581).
 Lt.-Col. (temp.) J. Fleming, M.D., *F.R.F.P.S.* (157732).
 Lt.-Col. (temp.) G. M. Frizell, *T.D.*, M.D. (47891).
 Lt.-Col. (temp.) F. D. Hart, M.D., *M.R.C.P.* (236062).
 Lt.-Col. (temp.) A. G. Johnson (135605).
 Lt.-Col. (temp.) B. R. M. Johnson (159187).
 Lt.-Col. (temp.) J. B. King, M.D., *F.R.C.P.* (223519).
 Lt.-Col. (temp.) A. J. C. Latchmore, *M.B.E.*, M.S., *F.R.C.S.* (87660).
 Lt.-Col. (temp.) W. A. Mill, M.S., *F.R.C.S.* (234733).
 Lt.-Col. (temp.) J. D. W. Pearce, M.D., *F.R.C.P.* (131687).
 Lt.-Col. (temp.) R. W. Raven, *F.R.C.S.* (218890).
 Lt.-Col. (temp.) L. F. W. Salmon, *M.B.E.* (62962).
 Lt.-Col. (temp.) J. R. St. G. Stead, *F.R.C.S.* (122742).
 Lt.-Col. (temp.) A. Watson, M.B., *F.R.C.S.* (171528).
 Lt.-Col. (actg.) J. B. Bishop, M.D. (68480).
 Maj. R. V. Facey, *T.D.*, M.B., *F.R.C.P.* (45023).
 Maj. G. D. Falconer, M.B., *F.R.C.S.* (98998).
 Maj. R. A. P. Gray, M.B. (56258).
 Maj. (temp.) L. C. Beadle (244058).
 Maj. (Qr.-Mr.) (temp.) R. E. Broughton (47820).
 Maj. (temp.) K. Cameron, M.B. (78603).
 Maj. (temp.) A. V. Dickie, M.B. (90015).
 Maj. (temp.) J. A. P. Evans, M.B. (236046).
 Maj. (temp.) D. I. Finer (112033).
 Maj. (temp.) A. Findlay, M.B. (107338).
 Maj. (temp.) R. S. Garden, M.B. (223277).
 Maj. (temp.) A. Gourevitch, *M.C.* (94311).
 Maj. (temp.) J. A. Gordon, M.B. (107670).
 Maj. (temp.) F. C. Hyland, M.B. (171198).
 Maj. (temp.) D. Jefferiss, M.B. (77850).
 Maj. (temp.) H. C. Johnston, M.B. (119751).
 Maj. (temp.) C. D. P. Jones, *M.B.E.*, M.B., *F.R.C.S.* (136634).
 Maj. (temp.) F. Kane, M.B. (205062).
 Maj. (temp.) A. B. Kettle, M.D., *M.R.C.P.* (246763).
 Maj. (temp.) I. Leveson, M.B. (241091).
 Maj. (temp.) J. N. Macartney, *M.B.E.* (131336).
 Maj. (temp.) S. Mackenzie (111761).
 Maj. (temp.) W. Mackenzie, M.B. (93586).

Maj. (temp.) A. A. MacNair, M.B. (139370).
 Maj. (temp.) R. L. Marks, M.B. (89376).
 Maj. (temp.) W. E. Mashiter, M.D. (120189).
 Maj. (temp.) R. G. Miller, M.B. (108722).
 Maj. (temp.) R. Mowbray, M.D., *M.R.C.P.* (96856).
 Maj. (temp.) P. B. L. Muldoon, M.B. (211967).
 Maj. (temp.) A. D. Newsholme (111777).
 Maj. (temp.) J. G. O'Sullivan, M.D. (122369).
 Maj. (temp.) W. A. Owen (101251).
 Maj. (temp.) E. Pereira, M.B. (230078).
 Maj. (temp.) E. H. D. Phillips (163707).
 Maj. (temp.) H. P. Player (250367).
 Maj. (temp.) A. H. M. Richards, M.B. (79644).
 Maj. (temp.) G. I. M. Ross, M.B. (297503).
 Maj. (temp.) M. J. Saunders, M.B. (141041).
 Maj. (temp.) J. A. W. Shearer, M.B. (86037).
 Maj. (temp.) S. B. Smith (218953).
 Maj. (temp.) O. H. Theodor (240849).
 Maj. (temp.) F. L. Turner, M.B. (133966).
 Maj. (temp.) W. M. Walsh, M.B. (128579).
 Maj. (temp.) W. J. Walter, M.B. (106634).
 Maj. (temp.) R. H. Watson, M.B. (246184).
 Maj. (temp.) G. A. Wilson (161272).
 Maj. (temp.) C. L. Worthington, M.B. (239046).
 Maj. (actg.) C. W. A. Falconer, M.B. (230079).
 Maj. (actg.) B. S. C. Gaster, M.B. (139362).
 Maj. (actg.) R. I. McAlley, M.B. (236135).
 Capt. H. Abramovich, *M.C.*, M.B. (126442).
 Capt. J. H. Adams, M.B. (260578).
 Capt. P. B. Angus, M.B. (211575).
 Capt. J. R. Armitage, M.B. (266223).
 Capt. C. L. F. Beaton (216035).
 Capt. W. H. C. Bell (318035).
 Capt. J. H. Bennett, M.B. (239219).
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 Capt. J. Brod (227638).
 Capt. T. O. Candler, M.B. (301349).
 Capt. (Qr.-Mr.) W. H. Chadbourne (154207).
 Capt. M. A. Chamberlain, M.B. (107304).
 Capt. (Qr.-Mr.) F. B. Cooper (231129).
 Capt. R. C. Connolly (71528).
 Capt. J. H. Cule (306047).
 Capt. R. B. Davies, M.B. (127191).
 Capt. W. A. J. Donald, M.B. (263437).
 Capt. L. Dornan, M.B. (231708).
 Capt. (Qr.-Mr.) A. F. Down, (231146).
 Capt. J. F. B. Edeson, M.B. (248770).
 Capt. P. K. D. Edmunds (168254).
 Capt. G. Godfrey (227251).
 Capt. C. L. Grandage (230144).
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 Capt. J. M. Hilditch, M.B. (246329).
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 Capt. D. R. Hughes (248188).
 Capt. F. G. Hunter (181489).
 Capt. P. E. Jackson, M.B. (328907).
 Capt. (Qr.-Mr.) B. N. Jeffery (181836).
 Capt. D. Klein (317647).
 Capt. M. Knowles, M.B. (322029).
 Capt. R. A. Lambourne, M.B. (230448).
 Capt. R. W. Lush, M.B. (133492).
 Capt. H. N. Mansfield, M.B. (246973).
 Capt. C. R. McClure (119915).
 Capt. R. McInroy, M.B. (239229).
 Capt. (Qr.-Mr.) H. A. Mullington (221701).
 Capt. J. M. Munden (248195).
 Capt. H. B. M. Murphy, M.B. (128574).
 Capt. D. F. Nicholson, M.B. (252543).
 Capt. D. A. O'Sullivan, M.B. (257496).

Capt. R. T. Parkin, M.B. (287889).
 Capt. G. H. Parkinson, M.B. (246811).
 Capt. I. M. Sievers (294895).
 Capt. P. S. Steen (266564).
 Capt. W. R. McL. Stevenson, M.B. (244050).
 Capt. J. H. Stranger, M.B. (248125).
 Capt. B. S. Tulloch, M.B. (119929).
 Capt. J. P. Turney, M.B. (246781).
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 Capt. D. Weitzman, M.B. (297509).
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 Capt. T. K. Whaley (329848).
 Capt. P. J. White, M.B. (191098).
 Capt. W. W. Willson (114770).
 Capt. (Qr.-Mr.) (temp.) A. W. J. Cooper (279495).
 Capt. (temp.) L. H. Moore (317423).
 Lt. H. Baker (297418).
 Lt. (Qr.-Mr.) F. J. Bird (246554).
 Lt. (Qr.-Mr.) E. A. Creed (239172).
 Lt. R. Frankham (329805).
 Lt. (Qr.-Mr.) G. H. W. Garner (309008).
 Lt. W. A. Reynolds (317653).
 Lt. (Qr.-Mr.) R. M. Wren (221631).
 7516344 W.O. I A. H. Bunston.
 7357931 W.O. I A. S. Carpenter.
 7369927 W.O. I D. W. Forsyth.
 7516611 W.O. I G. Gamble.
 7259886 W.O. I W. P. Johnson.
 7260273 W.O. I G. J. Lynch.
 7340442 W.O. I W. Street.
 7518177 W.O. I (actg.) E. J. W. Daniels.
 7346701 W.O. I (actg.) J. H. Savidge.
 7260557 W.O. II W. A. Curry.
 7523116 W.O. II L. Dowson.
 7259035 W.O. II E. L. Guilfoyle.
 7266320 W.O. II T. Robb.
 7358796 W.O. II R. Robertson.
 7348716 W.O. II C. A. Rockhill.
 7349135 W.O. II A. J. Smith.
 7259416 W.O. II R. N. Stephenson.
 7358121 W.O. II P. J. Suter.
 7349818 W.O. II (actg.) R. R. Hardware.
 7363442 W.O. II (actg.) K. J. Warren.
 7524161 S.-Sgt. H. A. Aldington.
 7347983 S.-Sgt. J. F. C. Allchurch.
 7345142 S.-Sgt. E. H. Bonner, M.M.
 7374511 S.-Sgt. J. T. Boyce.
 7368289 S.-Sgt. F. Coates.
 7516548 S.-Sgt. A. Craddock.
 7263438 S.-Sgt. G. Dyce.
 7348297 S.-Sgt. T. H. Fletcher.
 7357073 S.-Sgt. C. N. Halford.
 7386846 S.-Sgt. G. F. W. Hart.
 7348823 S.-Sgt. R. Ineson.
 7358740 S.-Sgt. J. E. Jayes.
 7516164 S.-Sgt. D. T. Lewis.
 7262347 S.-Sgt. G. K. Smith.
 7354947 S.-Sgt. H. Smith.
 7346582 S.-Sgt. C. R. L. Tebbitt.
 7520410 S.-Sgt. K. J. Wilding.
 7354284 S.-Sgt. (actg.) H. E. Buckell.
 7517532 Sgt. J. H. Barnes.
 7519248 Sgt. F. G. Baur.
 7385859 Sgt. A. G. C. Bingham.
 7377419 Sgt. A. Bowater.
 7349647 Sgt. E. H. Box.
 7262806 Sgt. H. J. Callaghan.
 7380294 Sgt. C. Colley.
 7380082 Sgt. L. Day.
 7348480 Sgt. R. F. Dewdney.
 7264371 Sgt. T. H. Everett.
 7345493 Sgt. S. J. Giddy.
 7366766 Sgt. A. Grieg.
 7376198 Sgt. C. W. Hilliard.
 7371826 Sgt. H. G. Hobden.
 7358021 Sgt. R. Hodgson.
 6711927 Sgt. G. Holland.
 7348660 Sgt. N. Hughes.
 7375644 Sgt. W. J. Hughes.
 7349571 Sgt. H. T. Hunt.
 7264491 Sgt. M. Kirkwood.
 7357361 Sgt. B. Lee.
 7388967 Sgt. W. B. Loan.
 7518067 Sgt. E. B. McBeath.
 7339493 Sgt. G. Neil.
 7258534 Sgt. J. E. Nightingale.
 7383642 Sgt. A. Oakley.
 7359890 Sgt. D. Preston.
 7375623 Sgt. B. Ramsden.
 7382063 Sgt. L. Reynolds.
 7384407 Sgt. R. E. Sheppard.
 2652609 Sgt. H. Sherwin.
 7381679 Sgt. W. M. Snook.
 7535248 Sgt. N. V. Stuart.
 7261894 Sgt. J. Tew.
 7354598 Sgt. C. W. P. Ventress.
 7517665 Sgt. G. E. Webb.
 7369739 Sgt. J. White.
 7519840 Sgt. J. F. Wilkins.
 7354610 Sgt. H. Williams.
 7517150 Sgt. W. G. Williams.
 7523866 Sgt. E. S. Windwood.
 7516798 Sgt. W. Wright.
 7263847 Sgt. (actg.) H. Knight.
 7385015 Lce.-Sgt. R. Hunter.
 7522371 Lce.-Sgt. S. Hyde.
 7266548 Lce.-Sgt. H. Inman.
 7349349 Lce.-Sgt. R. Lorrimer.
 7522299 Lce.-Sgt. J. P. W. Philp.
 7389735 Lce.-Sgt. H. Stirzaker.
 7516342 Cpl. W. T. Amphlett.
 7357831 Cpl. E. W. Barlow.
 7348360 Cpl. H. Boardman.
 7382528 Cpl. J. W. Brown.
 7389821 Cpl. M. T. Clarey.
 7519924 Cpl. F. Cole.
 6921842 Cpl. E. Cox.
 7386489 Cpl. R. Crawford.
 7375524 Cpl. J. R. Cumming.
 7395678 Cpl. N. C. Davies.
 7354721 Cpl. T. E. Davies.
 7359749 Cpl. K. H. Davis.
 7395596 Cpl. K. Doe.
 7391828 Cpl. W. Dunlop.
 1454465 Cpl. C. Gibson.
 7386970 Cpl. E. D. Green.
 7266130 Cpl. M. L. Green.
 7395326 Cpl. G. C. Harris.
 7370756 Cpl. J. A. Highwood.
 7364731 Cpl. D. F. Jones.
 7359077 Cpl. B. Larkin.
 7344626 Cpl. C. T. Leather.
 7535164 Cpl. A. Ling.
 7383622 Cpl. H. Lowe.
 7377412 Cpl. J. D. G. Matthews.
 3760630 Cpl. S. G. Matthews.
 7376159 Cpl. H. E. Phipps.
 4115101 Cpl. F. Richmond.

7361874 Cpl. H. Rigg.
 7384690 Cpl. H. Robins.
 7371968 Cpl. F. Skirrow.
 7369637 Cpl. N. E. Smith.
 7522136 Cpl. C. L. Stevenson.
 7521541 Cpl. H. W. Stripe.
 7516507 Cpl. L. Tweddle.
 7386327 Cpl. A. M. White.
 7349300 Cpl. (actg.) R. S. Brooks.
 7363891 Cpl. (actg.) D. L. Weal.
 2609503 Cpl. (actg.) W. Weaver.
 7370886 Lce.-Cpl. A. Baldock.
 7373266 Lce.-Cpl. A. G. Bishop.
 7516296 Lce.-Cpl. J. Blackhurst.
 7395270 Lce.-Cpl. D. W. Bridle.
 7406750 Lce.-Cpl. B. J. Crooks.
 7367585 Lce.-Cpl. J. H. R. Foster.
 7377436 Lce.-Cpl. J. Gennard.
 7379991 Lce.-Cpl. F. L. Holden.
 7394766 Lce.-Cpl. H. C. James.
 7520295 Lce.-Cpl. F. L. Jamieson.
 7375446 Lce.-Cpl. C. C. MacLaine.
 7358255 Lce.-Cpl. J. R. Owen.
 7264916 Lce.-Cpl. K. Patterson.
 745809 Lce.-Cpl. W. M. Pearce.
 7374320 Lce.-Cpl. J. Robinson.
 7398521 Lce.-Cpl. W. R. T. Shaw.
 7516503 Lce.-Cpl. C. R. Titcomb.
 7391726 Lce.-Cpl. L. Unwin.
 7522940 Lce.-Cpl. F. Ward.
 7375489 Lce.-Cpl. T. C. Wilson.
 7384290 Lce.-Cpl. R. H. Wood.
 7266819 Pte. W. Armstrong.
 7388070 Pte. A. H. Aiton.
 7406043 Pte. R. Anderson.
 7383568 Pte. S. Barker.
 7383566 Pte. J. J. Beardmore.
 7367103 Pte. J. Boshier.
 14252292 Pte. W. C. Braithwaite.
 7402689 Pte. R. M. Callan.
 7521207 Pte. M. H. Carson.
 7517314 Pte. E. C. Cawston.
 7380348 Pte. H. R. Clarke.
 7394824 Pte. D. B. Clement.
 7390267 Pte. W. N. Cockburn.
 7377889 Pte. T. L. Cockram.
 7406740 Pte. F. Coe.
 7367039 Pte. R. Cole.
 7406146 Pte. G. F. J. Collins.
 7390852 Pte. L. T. Coulter.
 7375961 Pte. V. Crighton.
 7364767 Pte. D. Every.
 7520507 Pte. A. J. Ewers.
 1142370 Pte. E. A. Field.
 7377154 Pte. K. Goodall.
 7385135 Pte. S. Green.
 5960993 Pte. J. Hackett.
 7380910 Pte. R. Hickson.
 7394339 Pte. H. Hodgson.
 7362345 Pte. R. T. Holdcroft.
 7382275 Pte. V. J. Holman.
 7401067 Pte. S. T. Holness.
 7361880 Pte. K. L. Hoyes.
 7400720 Pte. H. D. Hulse.
 7374782 Pte. W. R. Jackman.
 7519809 Pte. S. Jones.
 7401752 Pte. T. J. Jones.
 7356172 Pte. E. Kelly.
 7262477 Pte. R. Logsdail.
 3461382 Pte. E. J. Lunt.

7389876 Pte. W. Marshall.
 7349550 Pte. A. F. Mason.
 7392858 Pte. W. F. McCarthy.
 7401489 Pte. A. D. Mitchell.
 7384201 Pte. K. W. Nichols.
 7387809 Pte. J. Nicholson.
 7384217 Pte. J. L. Perrott.
 7368648 Pte. L. Petch.
 7400058 Pte. L. Phillips.
 7516908 Pte. E. Ray.
 7393282 Pte. R. G. C. Saunders.
 7375370 Pte. N. A. E. Saw.
 7366421 Pte. R. P. H. Smith.
 7259397 Pte. R. R. Smith.
 7377483 Pte. A. Spears.
 7383659 Pte. J. R. Spencer.
 7346692 Pte. L. H. Stanley.
 7517063 Pte. D. M. Stephens.
 7375294 Pte. S. Stevens.
 7358861 Pte. K. J. Vickers.
 14245558 Pte. R. J. Vine.
 13060390 Pte. A. Wilson.

Army Dental Corps.

Maj. (temp.) H. W. F. Freeth (142000).
 Maj. (actg.) C. H. Greaves (114321).
 Maj. (actg.) W. B. Hamilton (125130).
 Capt. A. R. W. Caskey (167589).
 Capt. F. C. Francis (33985).
 Capt. W. G. Godfrey (135690).
 Capt. S. W. Guilding (116876).
 Capt. J. K. Mackay (171578).
 Capt. D. C. Magill (238501).
 Capt. I. G. W. McLean (110043).
 Capt. G. M. Sanderson (142410).
 Capt. R. S. Stevens (106075).
 Capt. W. R. Timmis (123941).
 7392561 S.-Sgt. H. Bate.
 6666555 S.-Sgt. D. W. Grimbley.
 7538924 Sgt. K. G. F. Cadd.
 7537498 Cpl. G. Bubb.
 7536920 Cpl. J. Crook.
 7537372 Cpl. T. E. Fitzsimmons.
 7537861 Cpl. F. J. Handover.
 7539054 Cpl. F. W. Langrick.
 7538671 Cpl. N. A. Petherbridge.
 5389787 Pte. E. G. Silvester.

Queen Alexandra's Imperial Military Nursing Service.

P/Matron G. M. Luxton, *A.R.R.C.* (206272).
 P/Matron (actg.) M. M. Mirrielees, *R.R.C.* (206308).
 Matron M. E. Adams (206443).
 Sen.-Sister J. G. Porteous, *A.R.R.C.* (206387).
 Sister E. Abercrombie (206566).
 Sister E. J. Barclay (227688).
 Sister L. Beaumont (209580).
 Sister V. M. Bebington (209578).
 Sister M. Brown (227207).
 Sister E. P. R. Carr (206837).
 Sister M. W. Crawford (250818).
 Sister V. M. Dinneen (244237).
 Sister M. R. Epplstone (213190).
 Sister C. A. Hallahan (231387).
 Sister I. Harris (246119).
 Sister M. Hawkins (250831).
 Sister Mrs. N. B. T. Howard-Smith (208709).
 Sister E. M. Jackson (208549).
 Sister D. G. James (209630).

Sister Z. Lear (215377).
 Sister M. M. Loneragan (208689).
 Sister B. Mason (208919).
 Sister F. A. McLean (218097).
 Sister L. Morris (213870).
 Sister M. J. Ness (250854).
 Sister C. O'Neill (215237).
 Sister K. M. Peck (215174).
 Sister E. M. Thomas (209353).
 Sister E. Vannett (230804).
 Sister M. M. Wall (209430).
 Sister E. D. Williams (209455).
 Sister M. T. H. Wilson (244280).

Territorial Army Nursing Service.

Matron (actg.) J. K. Watt (215682).
 Sister E. M. Betteridge (209794).
 Sister H. J. G. Cameron (218252).
 Sister E. Evans (213209).
 Sister F. E. Harvey (213413).
 Sister V. Haw (213449).
 Sister M. B. Hield (213487).
 Sister M. Q. Jones (213608).
 Sister R. C. MacFarlane (213819).
 Sister O. M. Marchant (213966).
 Sister W. E. Millson (246275).
 Sister E. M. Monks (213939).
 Sister F. Prest (215130).
 Sister T. D. Rowe (215311).
 Sister E. V. Schofield (215429).
 Sister J. MacC. Todd (215599).
 Sister E. Thorpe (215586).

May 30

MENTIONED (Java, 1942)

Beadnell, T/Maj. H. M. S. G.
 Maisey, T/Maj. C. W.

June 6

C.B. (Burma)

Tyndall, A/Maj.-Gen. W. E., *C.B.E., M.C.*

C.B.E. (Burma)

Hawksley, L/Brig. J. C.
 Macalevey T/Brig. G. E., *D.S.O., M.C.*
 Marriott, L/Brig. H. L.
 Nicholls, L/Brig. M. F.
 O'Dwyer, T/Col. J. J.
 Swindale, A/Brig. A., *O.B.E., T.D.*

O.B.E. (Burma)

Lawless, T/Lt.-Col. D. J.
 Mitchell, T/Lt.-Col. W. C.
 Moorhead, T/Lt.-Col. C. E.
 Page, T/Lt.-Col. H. G., *M.B.E.*
 Serle, T/Lt.-Col. W.
 Sutcliffe, T/Lt.-Col. W. G.

M.B.E. (Burma)

Acton, Capt. H.
 Battye, W.O. I G. R.
 Bowman, Lt. (Q.M.) B. J. S.
 Cook, T/Maj. A. B.
 Ellis, T/Maj. B. H.
 James, Capt. (Q.M.) W. J.
 Martin, T/Maj. N. S.
 Minns, T/Maj. W.
 Ronayne, Capt. M. F.
 Simpson, T/Maj. J. McD.
 Thompson, A/Maj. H. D.

Walker, T./Maj. W. T.
 Watson, T/Maj. D. B.
 Younghusband, T/Maj. J. D.

M.C. (Burma)

Jacobs, T/Maj. J.
 Evans, Capt. D.
 Pimblett, Capt. G. H.

("While Prisoners of War")

C.B.E.

Taylor, A/Col. J., *O.B.E.*

O.B.E.

Bowie, Lt.-Col. D. C.
 Collins, T/Lt.-Col. J. C.
 MacFarlane, Lt.-Col. L. R. S.
 Maisey, T/Lt.-Col. C. W.
 Shackleton, Col. C. O.

M.B.E.

Beadnell, T/Maj. H. M. S. G.
 Blair, Capt. G.
 Brown, Capt. K. P.
 Cayley, Capt. F. E. de W.
 Childs, W.O. I E. G.
 Coombes, Capt. A. H. R.
 Doughty, W.O. I E. F.
 Graves, A/Maj. P. R.
 Harrison, Maj. G. F.
 King, Maj. A. C.
 Lancaster, Capt. R. L.
 Markowitz, Capt. J.
 Matheson, Capt. K. C.
 McNeilly, Capt. J. C.
 Murray, T/Maj. F. J.
 Petrovsky, Capt. C. C.
 Protheroe, Capt. T. S.
 Ramsay, Maj. R.
 Read, T/Maj. M. T., *M.C.*
 Roy, Capt. A.
 Seed, Capt. P. G.
 Taylor, Capt. R. D.
 Vardy, T/Maj. E. C.
 De-Wardener, Capt. H. E.
 Warrack, Capt. A. J. N.

B.E.M.

Dawson, Pte. K. 7362778.
 Dunlop, S/Sgt. J. H. 7262562.
 Gideon, Sgt. B. G. 7535052.
 Vaughan, Pte. G. W. 7380564.
 Wilson, Cpl. J. P. 6283472.
 Winterbottom, Pte. E. 7374341.

MENTIONED

Fraser, T/Maj. J. D.
 Campbell, Capt. (Q.M.) F. J.
 Taylor, Capt. (Q.M.) E. F.
 Owen, S/Sgt. A. 7263430.
 Cox, Cpl. T. F. 7264019.
 Clark, Pte. C. W. 7363131.
 Dodds, Pte. J. W. 7263124.

O.B.E. ("in the field")

Orban, Maj. F. P. H. E.

MENTIONED ("in the field")

Fraser, T/Maj. D. D. A.
 Macauley, Capt. D. R.

Butler, Pte. W. L. A. 7368793.
 Harne, Pte. H. W. 7378642.
 Morpeth, Pte. J. E. 7261838.
 Mills, Sister E. H. (Q.A.I.M.N.S.).

R.R.C. (Burma)
 Walshe, Sister M., Q.A.I.M.N.S.R.

A.R.R.C.
 Anderson, Sister M. D., Q.A.I.M.N.S.R.
 Dickenson, Sister S. J., Q.A.I.M.N.S.
 Littlejohn (*née* Anderson) Sister Mrs. I.,
 Q.A.I.M.N.S.
 Millar, Sister Mrs. C. F., T.A.N.S.
 Redfearn, Sister B., Q.A.I.M.N.S.

June 13.

BIRTHDAY HONOURS AND AWARDS

K.C.S.I.
 Wilson, Maj.-Gen. (L/Lt.-Gen.) G., C.B.,
 C.B.E., M.C., K.H.S.

K.B.E.
 Biggam, Maj.-Gen. A. G., C.B., O.B.E., K.H.P.

C.B.
 Cantlie, Maj.-Gen. N., M.C.
 Dowse, T/Maj.-Gen. J. C. A., C.B.E., M.C.

C.B.E.
 Rees, Brig. (local) J. R.

O.B.E.
 Foster, T/Col. W. G. S.
 Hoskyn, T/Lt.-Col. C. H.
 Raven, T/Col. R. W.
 Robertson, T/Lt.-Col. A. M.

M.B.E.
 Anderson, T/Maj. I. A.
 Biagi, Capt. R. W.
 Griffiths, T/Maj. D. L.
 McConnell, T/Maj. D. G.
 Walters, T/Maj. W. C.
 Williams, Capt. R. I.

B.E.M.
 Acaster, Cpl. H. W. 2014271.
 Baxendale, Pte. L. G. 7384024.
 Benton, A/Sgt. G. T. 7536503 (A. Dental Corps).
 Box, S/Sgt. G. E. P. 7520646.
 Demont, A/Sgt. H. G. A. V. 7263151.
 Dunn, Cpl. R. G. 7396941.
 Durant, A/W.O. II A. E. J. 7363607.
 Ferrie, Cpl. H. 7373883.
 Garbett, Cpl. C. F. 7367379.
 Pennant, A/Sgt. C. G. 7345987.
 Riddle, S/Sgt. J. R. 7374662.
 Smith, A/W.O. II J. 5780483.
 Taylor, Sgt. R. 7406055.
 Williams, A/W.O. II J. D. 838708.

Nursing Services.

C.B.E.
 Patterson, Chief Prin. Matron J. A., R.R.C.
 Wilkinson, Matron-in-Chief (Mrs.) L. J., O.B.E.,
 R.R.C.

R.R.C. Bar
 Bell, A/P. Matron E. M., R.R.C., Q.A.I.M.N.S.

R.R.C.
 Campbell, A/Matron V. B., Q.A.I.M.N.S.
 Canny, A/Matron J. M., Q.A.I.M.N.S.
 Cook, A/P. Matron E., Q.A.I.M.N.S.
 Evens, A/Matron M. I., T.A.N.S.
 Hinchey, A/Matron R. M., Q.A.I.M.N.S.
 Holmes, A/P. Matron F., Q.A.I.M.N.S.
 Jolly, A/Matron E. F. W. M., Q.A.I.M.N.S.
 Mitchell, A/Matron M. J., Q.A.I.M.N.S.R.
 Spedding, Matron V. C. D., Q.A.I.M.N.S.
 Watson, A/P. Matron A. S., Q.A.I.M.N.S.
 Wheelock, A/P. Matron F. V., Q.A.I.M.N.S.R.
 Whitworth, Sister A., Q.A.I.M.N.S.

A.R.R.C.
 Adcock, Sister G., Q.A.I.M.N.S.R.
 Bradley, Sister A. M., Q.A.I.M.N.S.R.
 Breet, Sister H. P. K., Q.A.I.M.N.S.
 Davies, Sister N., Q.A.I.M.N.S.R.
 Drennan, Sister J., Q.A.I.M.N.S.
 Eales, Sister D., Q.A.I.M.N.S.R.
 Fisher, Sister H. M., Q.A.I.M.N.S.R.
 Harley, Sister L. M., T.A.N.S.
 Heselton, S. Sister H. T., Q.A.I.M.N.S.R.
 Houghton, Sister M., T.A.N.S.
 Kenkins, Sister K. M., Q.A.I.M.N.S.R.
 Kennedy, Matron E. J., T.A.N.S.
 Lopatecki, Sister (Mrs.) F. M., Q.A.I.M.N.S.R.
 Macleod, Sister (Mrs.) M. J., Q.A.I.M.N.S.R.
 McCormish, Sister E. M. M., Q.A.I.M.N.S.R.
 McLean, Sister L., Q.A.I.M.N.S.R.
 Morton, Sister I. M., Q.A.I.M.N.S.R.
 Parkinson, Sister G., Q.A.I.M.N.S.R.
 Reynolds, Sister B. M., T.A.N.S.
 Skelton, Sister E., T.A.N.S.
 Wart, Sister D. A. V., Q.A.I.M.N.S.R.
 Walsh, Matron E. M., Q.A.I.M.N.S.
 Woodman, Sister K., Q.A.I.M.N.S.R.
 Yates, Matron E., T.A.N.S.

May 14.—Lt.-Col. A. J. Beveridge, O.B.E.,
 M.C., M.B. (8619), from R.A.M.C., to be Col.,
 May 1, 1946, with seniority Dec. 21, 1944.

Col. J. B. A. Wigmore, M.D. (4881), late
 R.A.M.C., retires on ret. pay, May 13, 1946,
 and is granted the hon. rank of Brig.

Capt. T. M. W. D'Arcy (67849) to be Maj.,
 Apr. 23, 1946.

Lt.-Col. F. C. Tibbs (15776) retires on ret.
 pay, May 13, 1946, and is granted the hon.
 rank of Col.

Short Service Commns.

Lt. P. A. T. Wood (345308) to be Capt.,
 May 5, 1946.

Capt. M. J. G. Furnell (75586) to retire
 May 15, 1946.

May 21.—Maj. H. G. G. Robertson (41303)
 to be Lt.-Col. May 1, 1946.

Short Service Commn.

War Subs. Capt. P. L. G. Cole (301134) from
 R.A.M.C. (Emerg. Commn.) is granted a Short
 Service Commn. in the rank of Lt., Nov. 6,
 1943, and to be Capt., Nov. 6, 1944.

May 28.—Col. W. Foot, M.C., M.B. (15373),
 late R.A.M.C., to be Maj.-Gen., May 27, 1946.

Lt.-Col. T. Menzies, *O.B.E.*, *M.B.* (8428), from *R.A.M.C.*, to be Col., May 27, 1946, with seniority Nov. 9, 1944.

Maj.-Gen. G. A. Blake, *C.B.*, *M.B.*, *K.H.S.* (4799), late *R.A.M.C.*, on completion of four years in the rank, is retained on the Active List (supern.) May 27, 1946.

Maj. E. M. Hennessy, *M.B.* (41298), to be Lt.-Col., May 27, 1946, with seniority Jan 12, 1946, next above Lt.-Col. H. E. Knott, *M.D.* (41299).

Capt. D. J. Waterston, *M.B.E.*, *M.B.* (90095), retires May 28, 1946, and is granted the hon. rank of Maj.

May 31.—Maj.-Gen. T. O. Thompson, *C.B.*, *C.B.E.*, *D.M.*, *K.H.P.* (4850) late *R.A.M.C.*, to be local Lt.-Gen., Mar. 25, 1946.

War Subs. Lt.-Col. G. S. Musgrove, *M.D.* (65603), retires with a gratuity, May 29, 1946, and is granted the hon. rank of Col.

June 4.—

Ret. Offr. Re-employed.

Lt.-Col. H. W. L. Allott (4800) reverts to unemployment on account of disability, June 4, 1946, and is granted the hon. rank of Lt.-Col.

June 7.—

Short Service Commns.

War Subs. Capt. G. M. Homan (306684) from

Emerg. Commn. to be Lt., Jan 29, 1944, and to be Capt., Jan 29, 1945.

Maj. J. A. G. M. Lynch, *M.D.* (68362), retires Apr. 27, 1946.

MEMORANDUM.

Lt. (Qr.-Mr.) (War Subs. Capt. (Qr.-Mr.)) G. Ashton, *M.B.E.* (101236), h.p. list, late *R.A.M.C.*, retires on ret. pay on account of disability, June 8, 1946, and is granted the hon. rank of Maj.

June 11.—Capt. (War Subs. Maj.) P. J. Fox, *M.B.* (73580) retires and to receive a gratuity, June 11, 1946, and is granted the hon. rank of Lt.-Col.

Short Service Commn.

War Subs. Maj. L. R. Dalton (169116) is apptd. to a permanent commn. Jan 24, 1946, retaining his present seniority.

THE ARMY DENTAL CORPS.

May 31.—Lt.-Col. H. J. Procter (5434) having attained the age for retirement is retained on the Active List (supern.) May 16, 1946.

Maj. S. H. Woods, *O.B.E.* (5446), to be Lt.-Col., May 16, 1946.

R.A.M.C. GOLFING SOCIETY.

Summer Meeting 1946.

Thursday, June 6, was quite the finest day of a hectic half week, during which many of us went to the Derby, strove mightily at Walton Heath, travelled from afar to meet after six years of war at the Corps At Home and Dinner and then rested over the Whitsun week-end.

For this reason and because we have not had a bad day for any of our Summer meetings since 1936, it may be assumed almost that the gods smile on the activities of our Society: at all events, the special branch of the celestial directorate, which deals with weather, advance planning, special provision of, etc., laid on a grand day for our first post-war meeting.

It was a pity that not more than 20 members could turn out to enjoy the pleasant surroundings and the comfort of the clubhouse beside the two excellent courses at Walton Heath, to say nothing of a crack with a 1946 "Dunlop 65." Thanks to the manager of the Sports Department of Messrs. Dunlop Rubber Co., who authorized specially for us a priority issue, these brand new balls were on sale at 3s. 9d. each before their general release to the trade. After the ersatz and remould balls we have been thumping in latter years, the satisfying click off the club and the bit of extra length one got was a real treat.

We were sorry not to see more of our members on this occasion and we missed them sadly, but travel is still difficult. We received several nice letters wishing us a successful meeting.

Walton Heath was in splendid condition. The well-kept greens looked like undulating billiards tables. In one respect this appearance was deceptive: not that a well struck putt did

not run true, but there was much more "bite" to these greens than there appeared to be. Until this fact had been realized, a good many pitches and run-ups stopped annoyingly short.

As to the scores returned, they were scarcely up to pre-war standard.

Lack of practice and ignorance of the local geography accounted for most of this, while excursions into the paralysing tiger country produced some tragic figures. These factors were certainly more responsible than the preponderance of seniors in the list of competitors, as the returns prove.

We were greatly encouraged by the attendance of Lt.-Gen. Sir James Hartigan, Lady Hood, who presented the prizes to the winners, and several other Corps wives, who all followed the general play and especially the fortunes of their striving spouses in particular with mingled keenness and anxiety. This gave us as much pleasure as did the success of the D.G. in the major event of the day, when he tied with Maj. R. E. Waterston, our youngest back marker on the day.

All sympathized with Sir James, who has always been a keen golfer and so interested in the fortunes of the Society—he is a past President, an Honorary Vice-President and an original member—that he can no longer grip a club. He is respected and beloved by us all. The D.G.'s success indicates that he has not only recovered well from a temporary indisposition, and is running true to form, because in this year's annual match, Admirals *v.* Generals at Camberley Heath he won his match in the singles and only lost in the four-somes by a good long putt for a "birdie" 3 on the last green.

RESULTS.

MORNING.—No. 1. COURSE.

Vesey Holt Memorial Challenge Cup. 18 holes medal play under handicap. (Holder Lt.-Col. G. Harding, 1939.)

Lt.-Gen. Sir Alexander Hood	(- 6) = 82	} Tied*
Maj. R. E. Waterston	(- 3) = 82	
Col. C. D. K. Seaver	(- 9) = 84	
Col. P. J. Ryan	(- 7) = 85	
Capt. P. J. Pugh	(-12) = 85	
Col. W. P. Croker	(- 9) = 86	
Brig. D. C. Monro	(- 3) = 86	
Lt.-Col. W. G. Harvey	(- 9) = 87	
Brig. B. J. Daunt	(- 7) = 88	
Col. F. S. Irvine	(- 8) = 89	
Maj. A. P. Trimble	(- 8) = 89	
Col. M. J. Williamson	(- 7) = 91	
Lt.-Col. B. Levy	(-18) = 92	
Maj.-Gen. J. C. Dowse	(-13) = 94	
Col. T. I. Dun	(-11) = 95	
No return. Maj.-Gen. G. A. Blake, Brig. J. S. K. Boyd, Col. E. B. Marsh.		
*Maj. Waterston elected to take the Scratch prize.		

AFTERNOON.—No. 2 COURSE.

Bogey Competition under handicap.(a) *Handicap —12 or under.*

Brig. D. C. Monro	3 down†	} Tied
Col. C. D. K. Seaver	3 down	
Maj. Waterston	3 down	
Lt.-Col. W. G. Harvey	5 down	
Lt.-Gen. Sir A. Hood	6 down	
Maj. A. P. Trimble	6 down	
Col. M. J. Williamson	7 down	
Brig. B. J. Daunt	8 down	

Col. E. B. Marsh 8 down

(b) *Handicap —13 or over.*

Lt.-Col. B. Levy 9 down† } Tied
Maj. Gen. J. C. Dowse 9 down }
† Won on the best first 9 holes.

Colonel Seaver deserves sympathy; virtually runner-up in both events he was baulked of his share of the spoils by ties. Bad luck, "Bob"!

Heavens! How dreadfully senior many of us have become!

It is quite comforting to note in the list of entries a senior Captain (Capt. Pugh, a staunch supporter and golf enthusiast), a brace or so of Lt.-Cols. and two mere Majors. Lt.-Col. Levy, our latest recruit, won a prize at his first attempt.

A General Meeting was held after the competitions. The following office bearers were elected:—

Vice-President .. Col. F. S. Irvine (Re-elected).

Captain Col. W. P. Croker.

Hon. Sec. and Treas. Col. T. I. Dun. (Brig. Monro resigned prior to posting overseas.)

Lt.-Col. Harvey has been appointed "Agent" for Northern Command.

Honorary Vice-Presidents (1946 to 1949).

Lt.-Gen. Sir James Hartigan.

Maj.-Gen. C. M. Finny.

" G. A. Blake.

" H. H. Blake.

Col. P. J. Ryan.

" J. M. Elliott.

C. G. Randolph, Esq. (of Glyn, Mills and Co.).

DEATHS.

ROSE.—In Ahmednagar on April 21, 1946, Lieut.-Colonel Gilbert Wolfridge Rose, M.B., R.A.M.C. Born Aug. 27, 1892, he graduated M.B., Edinburgh, in 1915 and was commissioned Lieut. R.A.M.C.S.R. He was promoted Capt. Oct. 10, 1918, being appointed to a regular commission with the same seniority on May 1, 1921. He was promoted Major April 10, 1927, and Lieut.-Colonel March 1, 1941. In the war of 1914-1918, he served on a hospital ship June, 1915, to Feb., 1916, and in Mesopotamia from March to Aug., 1916, and from Nov., 1917, till the end of the war. He was awarded the 1914-15 Star, British War and Victory Medals and the 5th Class of the Order of St. Sava. He served in the late war in France from Sept., 1939, till May, 1940, and in Malta from Dec., 1940, till Feb., 1943.

DALY.—In Australia on May 8, 1946, Lieut.-Colonel Francis Augustus Daly, C.B., R.A.M.C., Retired. Born in Dublin May 28, 1855, he took the M.B., Dublin, in 1878, the Diploma in State Medicine, Dublin, in 1887, and in the same year the F.R.C.S.I. Commissioned Surgeon Feb. 5, 1881, he was promoted Surgeon Major Feb. 5, 1893, and Lieut.-Colonel R.A.M.C. Feb. 5, 1901. He retired April 14, 1909. He served in Egypt in 1882, receiving the Medal and Bronze Star. He

again saw service with the Frontier Field Force in the Sudan in 1885-1886. He took part in the operations in Natal in 1899, including the actions at Talana; Relief of Ladysmith including operations on Tugala Heights; operations in Orange River Colony and Transvaal; he was Principal Medical Officer of a General Hospital from Feb. 5, 1901. Four times mentioned in despatches, he was created C.B. and awarded the Queen's Medal with four Clasps and the King's Medal with two Clasps.

WILLIAMSON.—In Frinton-on-Sea on June 4, 1946, Lieut.-Colonel Alexander Jeans Williamson, M.B., R.A.M.C., Retired. Born July 11, 1879, he took the M.B. Edinburgh, in 1900 and was commissioned Lieut. R.A.M.C. June 27, 1901. Promoted Captain June 27, 1904, Major March 27, 1913, he retired with the rank of Lieut.-Colonel June 3, 1922. After retirement for a time he was Hon. Surgeon Kingsbridge Cottage Hospital. He was re-employed during the late war from June 25, 1940, till Dec. 14, 1944. He took part in the operations in Cape Colony and Orange River Colony in 1902, being awarded the Queen's Medal with three Clasps. He served in France in 1916 and again in 1918 and 1919. He was mentioned in despatches and received the British War and Victory Medals.

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of the
Royal Army Medical Corps

Journal

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Royal Army Medical Corps

EDITED BY

COLONEL G. W. WILL, *O.B.E.*

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LIEUTENANT-COLONEL J. H. J. CROSSE, *O.B.E.*, R.A.M.C.

MANAGER :

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Original Communications.

PROPHYLACTIC SELECTION OF INDIAN TROOPS.

BY

Captain A. H. WILLIAMS,
Royal Army Medical Corps.

[Received January 9, 1946.]

THE object of this investigation was to find out the factors which influence the efficiency and morale of Indian Units. Two important groups of factors arise—the basic constitution of the Indian character, and the environmental influences which act upon it. The environmental factors are further divided into the usual ones, such as economic conditions, family affairs and education, and the military ones with which the newly enlisted sepoy is confronted.

The best means of obtaining co-operation and overcoming the resistance to the novel idea of the psychiatric investigation of a unit was to explain to the officers and V.C.O.s the object of the survey, and to ask for their opinions and help, so that they felt they had an important part to play. Once they realized that it was benefiting the unit co-operation was won. All men who were giving trouble, or complaining of troubles, were seen and, in addition, some good, well-adapted soldiers were seen as controls. In the cases of men who were worth retaining, readjustment was attempted by regimental rearrangement (putting square pegs into square holes), simple psychotherapy and medical treatment. Those who were considered to be incapable of becoming efficient soldiers were disposed of through regimental or through medical channels.

The following important factors are considered in detail :—

The Family Background.—The joint family is the unit of the Indian community. When the family has encountered misfortune, through the land workers dying or becoming ill, the sepoy is faced with an impossible situation. The provincial economy is dependent on all the arable land being utilized. There is very little give and take in the Indian village. Outsiders are always ready to steal the crops, use the land for their own purposes or even maltreat

the more helpless members of the family. There is no welfare work such as we know in England and, although the soldiers' board is a step in the right direction, it is still painfully inadequate. The sepoy, like the B.O.R., cannot fight on two fronts. He is perfectly willing to endure the toughest of situations providing that his home front is secure but, if it is not, he breaks down very rapidly. If a firm effort is made to do something about his troubles, he remains willing to serve, and many difficulties can be cleared up through regimental channels. Even if all the home difficulties cannot be rectified, the sepoy understands that an effort has been made and the good types carry on with their work. If, on the other hand, the sepoy is not satisfied that some effort is being made to help him, he becomes resentful, resistive and useless. He may commit military crimes of varying seriousness, or just become wooden, not using his common sense, and obeying only direct orders. In this state he frequently reports sick, sometimes with malaria, sometimes with fits, and in one or two cases a psychosis has been traced back to this type of reaction.

Military Tradition.—The backbone of the Indian Army consists of the military families who have always had several of their number in the Army. Among military families only two types of psychiatric cases were found. One type was the old soldier, often a V.C.O., who was tired of campaigning and who could no longer do the vigorous work which the younger men found easy. He broke down with hypochondriacal symptoms, or sometimes with an effort syndrome. The other type was the less able member of the family who enlisted, expecting promotion like his father. When he found that he remained without promotion and, when on leave was subjected to the jibes of his co-villagers, he lost confidence and enthusiasm. A man breaks down very easily when his pride is damaged. The B.O.R. does not seem to be so easily upset as the sepoy over damaged pride. A sepoy from the 2/7 Rajputs was referred with an hysterical paralysis of his left arm, following a jump by parachute in which he had fallen badly on his left side. No organic cause for the paralysis could be found and he would admit nothing in the way of fear or maladaptation. He said "make me better and I will fight." Pentothal narco-analysis revealed the fact that he was afraid. He had two brothers one a Lieutenant and one a Subadar. He joined the Army expecting to get on, found he did not, and hated going on leave to face the villagers as the family failure. He joined the paratroops in a desperate effort to prove himself. When the time came to jump, he found that he could not make it so he shut his eyes and made a bad landing. He finished up by saying he was through with Government service.

Class and Caste.—Class and caste feeling are still very important in Indian units. A man of sweeper class who enlisted as a rifleman in a Gurkha Depot, was killed by the other men who knew him in his village. The martial classes regard soldiering as a noble profession, not as a painful necessity as it is regarded by some B.O.R.s. Even when the B.O.R. is "browned off" and "fed up" he can fight quite well, but this is not the case with the sepoy, who can fight well only when he is contented, and well adjusted. The solitary sepoy, uprooted from his caste mates, does badly and tends to break down.

The presence of co-villagers helps to keep up morale in Indian units. The sepoy cannot risk damage to his reputation at home, and news of any timid behaviour could leak out quite easily through his co-villagers. If a man is without anyone from his district he often becomes depressed and shows far less adaptability than does the B.O.R. The worst cases of this type occur when a man from a different language group is alone in a unit. He cannot get into touch with the other men, and hence leads a solitary existence which often precipitates a breakdown. One sepoy from the Central Provinces, who spoke Hindi, was unusually dark and by some mistake had found his way into a Tamil-speaking unit. He broke down with hysterical fits, but responded to persuasion and explanation, which was followed by a regimental transfer to a unit in which his own language was spoken.

Leave.—The attitude of sepoys towards military service is different from that of the B.O.R., Indian troops are just as brave, but pay, food and leave occupy positions of greater importance in their lives. Many of the ill-adapted sepoys were found to have been from one to two and a half years without leave. If during this time practically every officer and V.C.O. has been on leave, the sepoy becomes resentful. He is very sensitive to injustice. Leave is very necessary for Indian troops, so that they may see their families, fix up their domestic affairs or rebuild their homes, which are rather flimsy and fall to pieces frequently. Leave is also essential in order to keep up the normal numbers of young children.

Religion.—If, in the interests of military efficiency, some of the religious customs have to be bypassed, it is no use doing so ruthlessly by means of a direct order. Resistiveness is provoked by this means of approach. Endless explanation and patience are necessary. The best method is to convince the V.C.O.s who will in turn propagandize the men. A good example of this is the initial resistiveness to eating dehydrated mutton, despite the fact that the animals were killed according to Hindu rites (Jhodka), or Muslim rites (Halal). Eventually most of the units succeeded in overcoming this prejudice, but only after a good deal of propaganda had been disseminated.

Leadership.—Strong, firm, understanding leadership yields an excellent return. The officer who is a mixture of schoolteacher, parent and commander obtains a degree of devotion unparalleled in British Units. The Indian soldier cannot be efficient when he is commanded by officers of doubtful quality who are retained because they are "decent chaps." The extreme dependence on good leadership and firm devotion to a respected leader has its roots in the basic suggestibility of the sepoy. Unfortunately, a few officers, who have been posted to Indian units compulsorily, do not like Indian troops. One such officer was seen dealing with sepoys. His whole manner became aggressive and unpleasant as soon as he started to work with I.O.R.s. Indian soldiers are very sensitive to such an atmosphere of disapproval; hard words hurt them more deeply than similar ones would hurt the B.O.R. Indian soldiers take their military life more seriously than B.O.R.s.

Companies which have had the same commanders for a long time are usually excellent. The continued relationship between commanders and

troops, which is nearly always on a hero-worship level, is a very powerful factor in maintaining morale at a high level. Some of the companies which were surveyed were outstandingly good and, in each case, the same company commander and V.C.O.s had been with the company for two years.

Psychiatric cases from such companies are very few, and those which do occur are quite different from those occurring in less efficient sub-units. The man who is weaker than his comrades, who gives way in the strain of battle, feels most dissatisfied with himself for having less stamina than the rest of his company. The man from less efficient companies blame their officers, their V.C.O.s, their fellow men, but never themselves. The high morale of a good company is infectious, its atmosphere being stimulating, whereas in a poor company discontent is obvious.

Intelligence.—The matrix test is not of great value in estimating the intelligence of illiterate or semi-educated Indian troops. Men who would appear to be dull by British standards are often just backward, and the way to judge intelligence is by the response to training and military performance. A few simple arithmetical and verbal tests were given, but these were used only as a check upon the more general findings, the opinion of the Company Commander and the Section N.C.O.

Physical Illness.—Physical illness is by far the most important factor in the ætiology of psychiatric conditions in Indian troops. The amount of physical illness in an Indian unit varies very widely. Pioneer companies and Engineering battalions are the worst in health. Among the units of a division, animal transport companies and signals suffer from the worst health, while the battalions and Artillery units have the best. The sick sepoy is often unaware that he has an illness, and he struggles on with reduced efficiency. When he feels that he can carry on no longer, he reports sick with an hysterical symptom, anæsthesia, deafness, dumbness, night blindness or fits. He may report sick with a symptom which is irrelevant, such as pain in the knee which, on examination, is found to be normal. When he is examined by the R.M.O. the real physical illness may be missed, because a complete physical examination has not been carried out. A number of cases of this type were referred as malingerers but gross physical illness was found. Psychiatric symptoms often turn out to be merely the mask of physical illness. One sepoy complained of palpitations and weakness, but not cough. On examination he was found to have tachycardia and extrasystoles. A few crepitations were heard at the left apex. X-ray examination revealed active pulmonary tuberculosis, and the sputum was positive. Another sepoy was referred with torticollis. He looked ill, but had no complaints other than the wry-neck. There were a few crepitations at the right apex, and the X-ray showed active tuberculosis. The torticollis was the sepoy's way of drawing attention to the fact that he was ill. Another patient was suffering from hysterical aphonia, and examination of his stools revealed infestation with ascaris, ankylostoma, and whipworm. His aphonia cleared up after anthelmintic treatment. Another man was referred with a history of hysterical fits for two months only, and examination of his fæces revealed vegetative

forms of *Entamoeba histolytica*. His condition cleared up with emetine treatment and three months later he came to tell me how well he was feeling. A Naik, who was interviewed, said he was very keen on doing well in the Army, but he could not run up hills or do a hard day's work like the other men. He belonged to a non-meat-eating caste. Physical examination revealed spongy bleeding gums, splenic enlargement, and anaemia. His blood slide showed M.T. Rings, and after a course of routine anti-malarial treatment, Multivite tablets, and convalescent diet, he made a good recovery. His C.O. reports that he is now doing good work. The most fruitful field from a therapeutic viewpoint is that in which psychiatric symptoms are found to have a background of physical illness. Vigorous treatment of the illness, plus reassurance and explanation, exerts a very good effect on the psychiatric condition. Psychosomatic unity has always to be borne in mind. The sepoy thinks very concretely, and abstract ideas are difficult for him to grasp. The fact that hysterical fits are psychological in origin is one that he cannot understand ; medical treatment often cures him, purely by its suggestive effect.

Over-enlistment.—Among the factors which aggravate the home difficulties of the sepoy is the over-enlistment which has taken place in some districts, and from some classes. There is usually great difficulty in getting labour to work the land for wages or for a share of the crops. Several of the more intelligent sepoys had made such an arrangement. When it is impossible to get anyone to work the land, the sepoy thinks that he should be given a compassionate discharge from the Army. Persuasion and explanation resulted in about 80 per cent of the men readjusting adequately. A few were unresponsive to explanation of this sort. In several cases, where three or four brothers had enlisted, and there was no one to work the land, compassionate discharge was arranged through regimental channels. The effect of this on the morale of the other brothers and on the surrounding troops is worth the minor loss of man-power which results from such action.

Indiscriminate Recruitment.—Indiscriminate recruitment has exerted a bad effect by enlisting men who are basically unfit to be fighting soldiers. They enlist for pay and food and break down when they get to the hard realities of soldiering. They may have the following conditions :—

- (a) Gross organic disease.
- (b) Psychiatric disorder, from civil life.
- (c) Lack of basic intelligence.

(d) Poor physique without definite disease. From one company of the 2/7 Rajputs, twenty men were referred on account of their small size. They were about the same height as a Gurkha, without his robust build. They weighed about 90 lb. and were not strong enough to carry their equipment for a full day's march. They were disposed of through regimental channels to garrison units. In addition to the above-mentioned conditions, over-enlistment and indiscriminate recruitment bring in men with more than the usual domestic and social problems.

A small number of men reported that they were press-ganged into the Army and were quite unwilling to serve. With persuasion and explanation, some of these men settled down satisfactorily.

Faulty Allocation.—There was a shortage of sweepers and many men, whose ordinary occupation was quite a different one, were enlisted as sweepers. Their dislike of the job and loss of face when they went home made proper adjustment difficult. One man who intended to be a sapper was quite illiterate, and it was found that, when he applied, his thumbprint showed that he had been enlisted as a sweeper.

Training.—The sepoy is slower to learn than the B.O.R., and patience is necessary in training him. It pays to explain what you want him to do and why you want him to do it. A B.O.R. usually knows why, and any delay in the execution of an order is probably due to bad discipline, but the sepoy often does not understand what is required of him. Long hours and boring repetition are tolerated very much more readily by the sepoy. He becomes a good soldier, slowly but surely, and takes an ingenuous pride in achievements about which the B.O.R. is merely cynical.

THE TYPES OF BREAKDOWN.

Battle Exhaustion and Anxiety States.—Anxiety states such as occur in the B.O.R. are not nearly so common in Indian troops. The sepoy very rarely admits fear, and only with great difficulty can he be made to understand that his symptoms are due to fear, and that fear by itself does not stop him from carrying out his duties. An old soldier, who had been on field service for five years in the Middle East, Italy, and the Arakan, complained of sleeplessness, decreasing powers of concentration and anxiety, but would not admit fear. He had marked tremors of the hands. He responded very well to simple treatment, but in view of his long period of field service, arrangements were made, through regimental channels, to send him to the training battalion. Another case broke down in battle last year. He appeared to be very intelligent. At first he would not admit fear, but later said "I was afraid in the last campaign, when I was hungry, thirsty and exhausted through lack of sleep. The bullets were flying around and everything seemed much worse than it did after I had slept well, and had my food, even though the danger was just the same." This insight is quite unusual amongst sepoys, and the C.O. was informed of this man's potentialities.

Hypochondriacal States.—Hypochondriacal states in Indian troops are primarily hysterical. When the sepoy can carry on no longer, he frequently complains of pains all over, recurrent fever, or he may localize the complaint to a condition which he had in the past, such as a pain in the splenic area. He often complains of dizziness and headaches, or breathlessness and palpitation. After excluding organic disease, the method of approach was to examine his environmental difficulties, and often the cause of his condition was found to be trouble at home, a quarrel in the unit, lack of promotion, lack of leave or fear in battle. These states were difficult to treat, especially when a large depressive element was present, but with suggestion, reassurance,

readjustment of home difficulties and often medicine given solely for its suggestive value, a large percentage of the men settled down well.

Hysteria (Convulsive).—Fits dating from childhood are very common in Indian troops, and often a charm (Taliz) had been obtained from the local priest, which, by its suggestive value, stopped the fits. The usual history was that the charm had been lost and the fits recommenced. Home-made charms did not work very well and, even if they resulted in temporary improvement, the patient nearly always relapsed. Much better results were obtained when the charms were made by a priest. Whether a sepoy is capable of serving in a forward area, when he is prone to attacks of convulsive hysteria, depends on his intelligence, his record and his response to suggestion. 70 per cent of men who suffered from hysterical fits returned to full duties, and about 10 per cent of these relapsed. Some responded badly from the beginning and had to be evacuated.

Hysteria (Motor).—The only special type of motor hysteria, peculiar to the I.O.R., is that following injury. The sepoy does not respond very readily to rehabilitation. Usually, after being wounded, he is glad to be out of the battle for a while and resents any attempt to return him to his unit in less time than he thinks is fair. These cases do quite well with suggestion, reassurance and supervised exercises and, with persistent treatment, even the more refractory cases responded.

NOTE.—The sensory and amnesic forms of hysteria occur very commonly among Indian troops, but present no special features.

Psychopathic Personality.—Cases with a definite psychopathic personality were evacuated for disposal, but a number of sepoys, who at first seemed to be psychopaths, turned out to be behaving badly in order to focus attention on their troubles. With firm handling, reassurance, encouragement and an attempt to rectify the family or village difficulties, some of these cases abandoned their negative attitude and became useful soldiers. In this respect, they differed very markedly from the true psychopaths who were unamenable to kindness and to discipline.

Malingers.—The border line between hysteria and malingering in the sepoy is more difficult to define than it is in the B.O.R. The calculating malingerer was usually found to be a psychopath but, more frequently, malingering was the sepoy's protest against injustice, real or imagined. The response to reasoning was quite good. A man with conjunctivitis, confined to the lower area, produced his condition by putting a little seed under the eyelid. He was told what he had done, and asked his reason for doing so. An interview with his C.O., to ask for help over home difficulties, had been prevented by the Havildar-clerk, through whom he had to approach the C.O.

The "Broken Heart Syndrome."—The broken heart syndrome appears to be a mild depressive state, peculiar to Indian troops. Disappointed men and those whose pride has been injured by loss of rank, or loss of face, develop a state in which they are depressed, complaining of dizziness, headache and inability to concentrate. They refuse to work, and are resistive to treatment. A typical statement is as follows, "My heart is broken, I have gone out of

my mind, what use am I? Send me back to my village." Reassurance and, sometimes transfer within the formation, often resulted in a satisfactory readjustment.

Psychosis.—Psychotic symptoms are frequent in Indian troops, particularly in South Indians, and have not the same diagnostic nor prognostic significance as they have with B.O.R.s. Physical illness is often the precipitating factor and recovery after a few weeks is common.

THE MARTIAL CLASSES.

Punjabi Muslims.—The Punjabi Muslims have made a greater numerical contribution to the Indian Army than any other class. Usually they are very good, but over-enlistment has brought in a number of weaker types. The village economy has been dislocated by insufficient men being left to till the land. Physically a large proportion of P.M.s are strong and healthy, because the food is good in most parts of the Punjab. The educational standard is low but there is great keenness to take advantage of the Army educational facilities. P.M.s seem to be the class most prone to hysterias, particularly of the convulsive type.

Pathans.—The Pathan is usually physically robust and mentally alert, but somewhat difficult to handle from a disciplinary viewpoint. The recruits from areas approaching the tribal territories are not so educated and do not appear to be so intelligent as those from districts where enlistment is usual. The Pathan has pride, dash and vigor in battle. The newly enlisted Pathans from Gilgit were seen in a mountain regiment, and, though utterly uneducated, they were keen and assimilated the training rapidly.

Sikhs.—The Sikh is variable and temperamental, often being brave, intelligent and shrewd. Sometimes he is cunning, unreliable and prone to malingering, or at least to exaggerating his complaints. He is proud, decisive, tending at times to ruthlessness, or even unscrupulousness. Sikhs are best kept busy and interested, when they have no time to get into mischief. Physically the Sikhs are the best of all the classes and deficiency diseases were minimal. Village troubles were less frequently encountered as the Sikh community appears to be efficiently run.

Rajputs.—The Rajputs from the Punjab, Rajputana and the North of the United Provinces are good fighting men, often better educated than the P.M. They seem to be more intelligent or at any rate to think more quickly. Their more rigid dietetic conventions have some adverse effects upon their health, so that they are not so resistive to physical illness as the P.M. The Rajputs from the Lower Ganges and Bihar are quite different, often being small frail men, lacking in fighting spirit and fit only for garrison duties.

Dogras.—The Dogras are similar to the Rajputs but, being hillmen from Kangra and its neighbouring districts, they tend to be more robust physically and have no special problems.

Gurkhas.—Gurkhas present fewest problems in battle as their main interest in life is fighting. Some regard the Gurkha as being slow-witted, but a man who can assimilate fieldcraft and training as well as the average Gurkha is

not dull. When he breaks down, which is a rare event, the Gurkha usually develops hysterical aphonia and deafness, sometimes with anxiety symptoms.

Garhwalis.—Garhwalis resemble Gurkhas but are less solid. Usually they are intelligent. Like the Gurkha when they do break down it is with hysterical aphonia and deafness.

Jats, Ahirs and Gudgers.—These classes are from the Delhi region, spreading northwards into the Punjab, southwards towards Gwalior and eastwards into the U.P. They are less physically robust, less intelligent, and appear to be less full of fighting spirit than the other martial classes. It was found that, for six of the years, between 1930 and 1940 the rainfall in this area was unusually low, resulting in a prolonged famine. Most of the sepoy examined were growing boys at this time, and the famine conditions to which they were subjected may have contributed to their being less good than the other fighting classes. The Jats are non-meat eaters, which still further affects their state of nutrition. The Jats of one unit, after a long period of jungle warfare, sustained a number of self-inflicted wounds. They were rested, trained and given convalescent diet and, since they have been in battle again, they have fought very well.

No prophylactic selection was carried out on South Indians or Mahrattas.

CONCLUSION.

Further selection of Indian troops had to be postponed owing to the recommencement of active operations. Two of the battalions surveyed are now doing well in battle, and their respective C.O.s have reported that prophylactic selection did a great deal of good.

THE MASSACRE OF THE ARDEATINE CAVES : Identification of the Dead.

**A report on the exhumation and identification of three hundred
and thirty-five bodies recovered from the Ardeatine Caves in Rome.**

BY

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THE Appian Way has been the silent witness to many deeds and misdeeds in the 2,000 years of its existence but it is hardly possible that it has witnessed any deed more foul than that of March 24, 1944, when 335 innocent individuals whose only crime was that they were Jews or anti-Fascists were murdered by Nazi firing squads in reprisal for the killing of 32 soldiers by Italian civilians. None of the victims played any part in the killing. Many of them had been in prison for months; many more had been arrested at the time of the incident although not involved in it and some others were nominated for execution by one man alone who was himself later captured, tried and executed.

The initial incident took place on March 23, 1944, in the city of Rome. It had been noticed that a column of German soldiers passed along a certain street (Via Rassella) daily at the same hour. This fact was noted by the anti-Fascist underground movement who decided to ambush them. The day chosen was the anniversary of the founding of the Fascist Militia. A University student was chosen to make the attempt. A dustman's handcart was used. A light steel case containing about 60 pounds of explosive was put inside this cart and packed round about with a similar amount of explosives. A fuse was set and ignited at the appropriate moment. The resultant explosion killed 32 Nazi soldiers and 3 civilians. The student made good his escape.

The German reaction was immediate and violent. All the houses in the vicinity were searched and the inmates turned out on the street (despite age, sex, or physical condition) and made to stand against a wall with their hands above their heads. The houses were ransacked from cellar to roof. Furniture was broken up and thrown to the street. Personal belongings underwent a similar fate except in the case of valuable items which became the individual Nazi's loot.

Of all the individuals removed from houses and seized in the street the males were later removed to a prison established by the Germans at their Headquarters in the Via Tasso. Estimates of this number vary between 70 and 250. The correct figure is probably about 70. The number included 2 boys aged 17 who had been seized in their home performing their lessons from school and a boy of 14 who, when his father was seized, accompanied him. They were shot the following day.

There are various hysterical versions of the subsequent events. The Nazi Commander (General Meltzer) decreed that reprisals would be taken to the extent of 10 Italians for 1 German. (Some say that the initial order was 100 Italians for 1 German but first, by the intervention of the Italian authorities, this was reduced to 20 and later, by the alleged intervention of the Vatican, it was further reduced to 10.) The Italian newspapers of March 26 carried the following official communiqué. "On the afternoon of March 23, 1944, criminal elements threw hand grenades against a German police squad passing through Via Rassella. As a result of this ambush 32 policemen were killed and many injured. The cowardly ambush was made by bandit Communists. Investigations are still going on to ascertain how much of this was due to Anglo-American incitement. The German Command is determined to put a stop to the activities of these nefarious bandits. The German Command has therefore ordered that for every German killed 10 bandit Communists will be shot. This order has already been carried out."

The selection of victims was peculiar and done arbitrarily. All individuals held in the Via Tasso or other German prisons were to be executed. The total number so held was approximately 270. A further 50 was required to swell the total to 320 and bring the number up to that decreed by General Meltzer. Fifty political prisoners held in the civilian jail (Regina Coeli) were therefore nominated for execution by the Chief of Police. But 335 bodies were found in the Ardeatine Caves. The additional 15 were nominated by Caruso who, as Chief of Police, ordered the inclusion of 15 individuals who were among his public and private enemies.

The execution took place at the Ardeatine Caves.

These caves are located in the Old Appian Way just beyond the famous "Quo Vadis" church and near to the Catacombs of St. Calixtus. The roadway runs in a cutting with high ground on both sides. The caves therefore run into the hillside. On the east side is the high ground which contains the galleries of the Catacombs of St. Calixtus. On the West side lie the Ardeatine Caves. There are no galleries in these Caves as there are in the Catacombs. There is an incline, however, in the floor level so that in point of fact the farther one enters the Caves the farther does one travel below road level. The Caves consist of a series of tunnels crossing and recrossing each other and all converge on several exits to the road. The tunnels into the hillside vary in length from 50 to 150 yards. They all end blindly. The breadth of the tunnels is even and measures about 12 feet. The height varies from 15 to 20 feet. The intersecting tunnels are of similar dimensions; several end blindly. The actual executions took place in a tunnel which stretches into the hill for about 100 feet. This tunnel opens into a further tunnel situated practically at right angles to it which ends blindly on the left at a distance of about 10 yards while on the right it extends into the hillside to meet another tunnel. The main entrance to the Caves is situated in a quarry about 100 feet from the road at road level.

The executions took place on March 24, 1944. At about 2 p.m. that day the intended victims were taken out of their cells and, with their wrists tied

behind their backs, they were led to army waggons into each of which were packed about 80 of the victims. They were relieved of any valuables they possessed but many had been able to secrete various items about their persons. This fact proved useful later in identification of those cases. All approaches to the Old Appian Way were closed and guarded by German soldiers. The waggons arrived at the spot and at about 4 p.m. the shooting began and continued till late at night if not, indeed, till the next day. It has been established that on arrival at the Caves a wagon would back into the mouth and then the victims were made to descend and driven along the tunnel. There was no set firing squad. From the position of the bodies as found it was obvious that they were herded along in groups varying from 1 or 2 to a maximum of 5. Some had obviously been shot singly. Others in pairs and threes. They lay where they fell. Those following fell on top of those in front. As the bodies piled on each other those following were made to climb on top of the mound. All were shot in the nape of the neck or back of the head with two exceptions, that of a father and son whose bodies were found in each other's embrace and whose skulls showed entrance wounds in the lateral aspect of the occipital bone. 263 bodies were found in the blind tunnel. They had been shot from a distance of about 10 feet. The remaining bodies were found in the main tunnel. All of these had been shot in the back of the head and it was more obvious here that the victims, prior to being shot, were made to climb on to the bodies of the earlier victims. Some, indeed, were made to kneel on the top of the pile as evidenced by the posture found on exhumation.

The commonest target for a firing squad is over the heart but it occasionally happens, even allowing for the fact that not all the firearms carry live shells, that the individual is not killed outright but has to be despatched by the officer in charge. A firing squad, however, aiming at the head and especially the back of the head means certain and instantaneous death.

When all the victims were executed the tunnels were sealed off by blowing up the roof at two points. This did not work according to plan, however, and, while a large amount of earth and rock did fall into the tunnels, they were not sealed off. All that really happened was that a circular hole was made in the roof about 10 feet in diameter, the debris from which sufficed to provide a thin covering for the masses of corpses.

These, then, were the events leading up to the executions and the details of the execution themselves as reconstructed at the time of the exhumations from the position and posture of the corpses.

The Germans, no doubt, hoped that the bodies would never be found (as evidenced by the attempts to seal off the portion of the tunnel) or, at least, that they would not be found for a long time to come. They had, however, overlooked the presence of a swine-herd in the fields above the tunnels and he brought the news to town of shootings at the Ardeatine Caves and then, of course, the Germans who, already were extremely occupied with the Allied Bridgehead at Anzio, were soon to be driven out of Rome by the advance of the 5th and 8th Armies from the south and the Anzio Bridgehead forces

from the sea. Rome fell on the night of June 4-5, 1944, i.e. eighty-four days after the executions. On July 26 the work of exhumation and identification began and continued up to December in which time all the bodies were exhumed and of the total of 335 found only 13 remained unidentified. Most of these are headless but it is very probable that some of them will be identified later as it is possible that they were not natives of Rome but are victims from Northern Italy. Only two Romans so far remain unidentified.

After a preliminary examination of the scene of the executions it was decided that all examinations would be done on the spot. All necessary laboratory facilities were therefore established within the Caves while outside a miniature laundry was set up. This step enabled the examination to be conducted more easily and is a parallel to the usual procedure of exhumation which it is always recommended should be done in the cemetery. It was also considered advisable to perform the examination within the Caves so that all the bodies should be maintained in the same environment throughout what was obviously going to be a long time and thereby prevent a final rapid decomposition which would undoubtedly occur if the bodies were moved to another location.

The first task was to remove the earth which had fallen into the tunnels following the attempt of the Germans to seal off that portion of the Caves by blowing in the roof and, coincidentally with this excavation, to shore up the neighbouring parts of the roof which had been weakened by the explosion. During this examination, a large number of hand grenades (32) was found and about 300 sticks of dynamite. This gave rise to the suspicion that the bodies of the victims were booby trapped. But, fortunately, this was not so. Many live bullets were also found and also one fully charged magazine of a German sub-machine gun, actually an automatic pistol, which by an extension of the stock can be used as a rifle.

The obstructions having been cleared, access to the two heaps of corpses was easy. The stench emanating from the heap of decomposing corpses was indescribable. I know of no words to do justice to the smell. It can only be imagined. The staunchest and strongest wilted, blanched and vomited. On such an occasion anosmia would have its advantages. The combination of sight and smell was ghastly and horrible. Appropriate measures were taken to substitute a less nauseating odour by means of forced ventilation with exhaust fans.

At first sight it was thought that only one pile of bodies existed and that in the main tunnel. The second and larger pile was located after clearance of the first lot of corpses. The attempted burial by blowing in the roof produced a very slight covering of earth from which protruded feet and limbs. In the main tunnel the corpses were piled in three layers and in the blind tunnel in five layers. The larger pile, measuring roughly 15 feet in length, filled the breadth of the tunnel, i.e. 10 to 12 feet, and was about 4 to 6 feet in height. The smaller pile was about 12 feet long to 10 to 12 feet wide and 4 feet high. Thus there were two large shapeless masses of corpses from

which emanated a most foul stench of putrefaction and of decomposed and rancid fat.

In addition there were swarms of flies and, as a crowning horror, hundreds of bloated mice swarmed near and through the corpses. It was found when it came to removal of the individual bodies that the skulls appeared to be a favourite habitat of the mice for in practically all the bodies when moved a mouse or mice darted out of the hole which had been blown in the skull. It is interesting to note that there were no rats found. The only answer I can suggest to this is that of the inhabitants hereabouts who say there are no rats to be found in this part of Rome at any time.

As might be expected the greatest number of the bodies were extremely friable. When it came to removal it was found, too, that many of the bodies were headless and in other cases limbs were lying as if they had been disarticulated. The lower jaw was also missing in a very great number of cases. All these deformities were obviously due to the normal processes of putrefaction and decay. The actual number of heads found detached from the body was thirty-nine and the number of mandibles was seventy. It was noticed that the bodies showing this mutilation were on the top of the pile and especially in those bodies on the fore edge of the pile where the victim fell forward and the head lay unsupported. Several of the skulls were found a short distance, varying from 3 in. or 4 in. to about 18 in., away from the main mass. While this was thought at the time to have been due to the depredations of mice I personally think it was just the ordinary roll of the head when gravity finally overcame the retention of the putrefying muscles and ligaments. This must be the solution, for all the mandibles lay evenly on the ground. They cannot roll. But if it satisfies the Latin character to say that the skulls were moved by rodents then it might be permissible to allow them this extravagance to increase the ghastliness of the whole incident.

From the photographs it will be seen that there was very little earth covering the pile of bodies. It may reasonably be assumed that such earth covering as there was, was caused by the dust settling following the blowing in of the roof and the dust movement in the tunnels during the two and a half months in which the bodies lay there. This earth covering was sodden with the fluids formed from the decomposing bodies and which, on the top layers and round the sides, served to knit and cement the bodies together and form a fairly efficient seal to the atmosphere. As the bodies were removed from on top of each other a cementing together was evident but here it was obvious that the substance, so cementing the bodies and forming practically an airtight mass, was adipocere formed by the putrefying bodies.

In order to ensure complete uniformity in the examination of each body, and to ensure as absolute and complete an examination as possible for each body, the following regime was instituted and adhered to without deviation in all cases. The primary essential was that only one body at a time would be removed in reverse order to that in which they fell as far as could be judged. This later proved to be extremely useful in identification of victims from one family, e.g. where there were two individuals from one family; in all instances

adjacent bodies in the pile of corpses were later identified as these individuals. To illustrate this each body as it was removed was numbered and in the case of two individuals from one family, say, for example, that in the final identification the questioning pointed to the probability of these victims being in bodies 7 to 10 or 11. Final examination often revealed these bodies as 7 and 8, or 8 and 9, or 9 and 10 and so on. In the case of one family which produced six victims the bodies were finally identified within a range of nine bodies and four were numbered consecutively; thus if the numbers were 1 2 3 4 5 6 7 8 9 the bodies of this family were found as (1) 2 3 (4) 5 6 7 8 (9).

As soon as a body was removed from the heap of corpses a superficial examination was made to see if it were complete. If complete, it was removed for full examination. If it were not complete, the missing parts were sought for without disturbing the remaining corpses. If a foot were missing it was an easy matter by comparison of the footwear on the body with any disjointed limb. With heads and hands it was naturally much more difficult and, in some cases, impossible. If the missing part were not found easily the search was not proceeded with. In two cases an attempt was made to identify the missing parts by comparison of blood groups by making a saline extract from the main body and comparing it against an extract made from the part suspected of belonging to that body. This is, however, a negative test only and was not proceeded with. The final identification of limbs was by the comparison of the measurements of the long bones, e.g. if one arm or one leg of a body were missing the long bones of the remaining limb were measured and matched with limbs of the same measurements.

All the bodies were clothed. This fact was very useful in the final identification as will be seen later. It also accounts in part for the well-preserved state of the bodies as it is well known that the process of putrefaction and decay are slowed down when a body is clothed.

The number which was given to each body as it was removed was also given to the various envelopes and bags which were used to contain the various articles found in the clothing of the individual and also samples of the individual clothing and hair. In the case of clothing and hair very liberal samples were taken. A different envelope was used for each item and each envelope was given the serial number of the corpse, thus one envelope would contain samples of the clothing, a second, trivial articles, e.g. matches, cigarette papers and trinkets, a third, more valuable articles, e.g. watches or rings or jewels, a fourth, messages or letters or identification cards and the fifth, the shoes worn by the victim with more samples of clothing. All these containers were taken away and the contents disinfected and cleaned by means most appropriate for the articles concerned (e.g. all metal objects were steeped in an antiseptic solution and later washed in soap and water) to restore them as far as possible to their original condition. As can easily be imagined they were all contaminated by the products of putrefaction. An accurate detailed description was then prepared for the contents of each envelope or bag. In this connexion it is interesting to note two points in regard to the clothing and personal effects of the victims. The first is that the articles coloured white or some

other fundamental colour remained unchanged, whereas articles of composite colours invariably assumed a more or less uniform grey appearance. The second is in the various written or printed articles found on the victims where it was noted that the writings in ordinary lead pencil or printers' ink had withstood destruction by the liquids and gases of putrefaction. The notes written in ordinary vegetable inks were completely indecipherable.

When the body had been removed to that part of the caves equipped as a laboratory for the final examination, and after removal of the various articles detailed in the preceding paragraph, the normal routine of examination for identification of the dead was proceeded with.

For ease of description the general examination and appearance of the corpses will be described first of all and the various other details of the examination will be described separately although all were performed simultaneously.

(1) *General Examination.*—As has already been stated each body was examined separately after removal from the pile to the table. Removal of the clothes revealed a state of affairs which, so far as I know, has never before been seen. This state of affairs can be summarized briefly in the question "Why were some of the bodies mummified and why did others show adipocere formation?" All the bodies were dead for the same length of time (within a matter of minutes in contiguous bodies and hours in the case of those killed at the beginning and the end) and all bodies were in practically the same environment except for those in the lowest layer who lay on the ground and those on the top layer whose backs were, apart from the slight covering of earth or dust, exposed to the air. All the circumstances being practically identical in each case it was therefore reasonable to presume that the general putrefactive condition and state of each body would be similar, at least, if not identical.

The conditions necessary for the formation of adipocere in a decomposing body are well known—moisture, absence of air-movement, lack of oxygen, and conditions unfavourable to the growth of bacteria. The appearance of adipocere is also well known—the characteristic rancid smell, the greasy, soapy feeling, friability, and colour (pearly white or grey, or brownish). The composition of adipocere is also known, i.e. a mixture of fatty acids produced by the hydrogenation of the body fats.

The conditions necessary for mummification are also well known and are exactly opposite to those required for the formation of adipocere.

Where there was adipocere formation, and this was in the great majority of cases, it was practically confined to the lower limbs and to the skin and underlying muscles of the anterior aspect of the abdomen, with a suspicion of its formation on the back of the majority of the individual corpses. It was not complete in any case and was not present in any of the internal organs. As is natural this condition was more evident in the more adipose bodies.

In the Catacombs, across the road from the Ardeatine Caves, all the bodies found were mummified. It was reasonable to assume that in these cases, too, the putrefactive process would be one of mummification as the



FIG. 1.—A close-up view of the larger pile of corpses. Note the absence of earth covering.



FIG. 2.—A close-up of the manner in which the victims' hands were tied:



FIG. 3.—There was rather more earth covering to this body. Note the well-preserved condition.



FIG. 4.—Removing the clothing and recording details of articles found therein. The assistant is holding up a pocket-handkerchief. Note the skeletonization of the skull. The man in horn-rimmed spectacles on the left is Professor Ascarelli who was in charge of the exhumation and identification.

temperature and ventilation were, despite the blowing in of the roof by the Germans, practically identical. In mummification the body becomes dry with a greyish brown colour, a marked wasting and diminution in weight and a wooden rigidity.

The majority of the bodies showed the presence of both processes, e.g. saponification of the legs and ventral aspect of the body and, if one can be excused an Irishism, a saponified mummification or mummified saponification of the dorsum. No case showed complete saponification. Several cases showed mummification to such a degree that, if left for a longer period, it might have been complete. The bodies on the top of the piles showed little or no saponification but only the ordinary process of putrefaction and decay with possibly a greater or lesser alteration due to a degree of mummification. Why should these differences be present? The extrinsic factors of moisture and temperature were identical for all. It must therefore be assumed that there are some intrinsic factors necessary for these conditions.

(a) *Adiposity of the Body*: It is known that the more adipose the body the greater and easier is the formation of adipocere.

(b) *Clothing*: It is known that the processes of putrefaction and decay are delayed when a body is clothed by the exclusion of air to the tissues.

(c) *Age*: It is known that the bodies of older people putrefy more slowly than those of younger people.

(d) *Fluid Content of the Body*: Given the proper set of circumstances the larger the fluid content of the body, i.e. the bigger the individual, the greater the likelihood of the formation of adipocere, as it is known in normal circumstances such bodies putrefy more quickly. The converse should be true for mummification.

It has already been stated that the mass of bodies were cemented together by the seepage of body fluids through the clothing from the overlying to the underlying body. This would therefore tend to exclude the air from the bodies and thereby assist in the process of saponification. The bodies lay on top of each other face downwards. The body fluids would therefore normally gravitate vertically and this would account for the greater degree of saponification of the thorax and abdomen. The seepage of the body fluids would be sufficiently slow and the temperature sufficiently high for a soap to form fairly quickly in the more adipose individuals. This would account for the mild degree of saponification found in the dorsum of some of the bodies as the moisture required was received from the upper body before full solidification of the adipocere in the upper body. When this happened no more moisture would be available and saponification would cease in the lower body. A body lying in the middle of the mass of corpses fully clothed would very shortly be enclosed and occupy an airtight space at a possibly higher temperature.

The presence of maggots and rodents, especially the latter, may also have had some effect on the condition of the bodies, as by their burrowing and excretions the moisture and air conditions within the piles would alter to some extent.

The formation of adipocere in the lower limbs can, I think, only be explained by the fluid content of the limb being comparatively large in relation to the other parts.

Many skulls were practically completely skeletonized. This was mainly due to the depredations of rodents.

So much for the general examination and an attempt to explain the condition of the bodies as found.

(2) *Sex*.—To begin with it was not known if all the victims were male, but no difficulty was encountered in establishing the sex in all cases as the length of the hair of the head, the distribution of the pubic hair, the presence of hair on the trunk and the presence of hair on the face were in all cases diagnostic of the male sex. In practically all cases, too, presence of the penis was evident.

(3) *Age*.—This was a rather more difficult and involved procedure as the great majority of the victims were between 20 and 60 years of age and for all these the estimation was more or less a guess and an approximation. In all cases under 25 the estimation of the age was rather more exact and instead of the age being recorded in these cases in terms of 10 or even 20 years it was possible to give an estimate to within a year or two. The age of the victims was arrived at by examination of teeth, the ossification of bones, calcification of the costal cartilages, fusion and ossification of the xiphoid process and the manubrium to the sternum, ossification of the laryngeal cartilages, obliteration of the skull suture and so on. In this mass determination of the ages of a large number of bodies there was abundant proof for Professor Brash's opinion that age estimation from skeletal changes, though providing a reliable basis, does not provide an exact determination but only within a range which varies from a year or so in individuals before puberty. "Thereafter the range must gradually lengthen and after thirty years when the mature skeleton already begins to show signs of 'ageing'—including the beginning of the progressive closure of the cranial sutures—it will hardly be safe to estimate more closely than in decades."

In this examination as has already been stated the majority of victims were aged between 25 and 45. There was one boy aged 14, one aged 15, two aged 17, five aged 18 and ten men between 60 and 70, with one man aged 74 years.

(4) *Stature*.—The stature of the individual was obtained in two ways as follows :—

(a) As has already been stated, all the corpses were clothed. Clothing was removed by cutting down the minimum number of seams. All the garments were then measured in accordance with the normal measurements taken by a tailor. These measurements were submitted to an expert tailor and he then submitted his estimates on the height and general build of the individual. While this may not be a very scientific method it served as a fairly reliable check as in all cases his assessment was practically identical to that obtained by more scientific means.

(b) The scientific means of estimating the stature used was the method described by Orfila (he was Professor of Anatomy at Paris) and by the use of

Manouvrier's Tables. This method, as far as I could assess, is similar, if not identical, to that which we call in Britain, Parson's Formula.

(5) *Race*.—The problem of identification of race did not arise.

(6) *Social Status, Habits, Trade*.—The social status of each victim was assessed from the type and condition of his clothing and footwear. Thus it was very easy to identify a priest in the body found clothed in a cassock. Similarly the soldiers and policemen executed could be identified from their uniforms. The individuals clothed in lounge suits and working clothes could be, with almost complete certainty, identified as being professional or artisan. So too, with the type of footwear, a reasonable assessment of the individual's status and calling was possible. Decomposition of the body was too far advanced to obtain any information from the texture and condition of the skin of the hands but it was noticeable that the manual worker's hands were larger and the preservation produced by the adipocere formation showed who had been a muscular individual and therefore more likely to be of the manual working class.

(7) *Hair*.—A liberal sample of the hair of the head was taken from each individual. If the individual was bald, this was noted, and where possible a careful description of the distribution of the baldness was taken in lieu of a sample of hair. The hair distribution of the rest of the body was carefully noted and described wherever possible.

(8) *Teeth*.—The examination of the teeth in all cases was carried out carefully. The results of any previous dental operations were noted and a full description recorded. In the final identification of the individual these details were reported on by the Dental Surgeon who had attended the man.

(9) *Evidence of Cause of Death*.—It was obvious in all cases that death had been due to wounding of the head caused by the discharge of one or more bullets directed towards the back of the head producing various types of exit wounds and in all cases causing death. It can reasonably be said that in all cases death was instantaneous but that is something which cannot be known definitely especially when one reads reports such as that by Dr. Douglas J. A. Kerr in a recent *Lancet* where an individual shot himself in the head, lay unconscious for several hours and then walked a total distance of about 300 yards, sought entrance to his house and said quite clearly that he must go to the bathroom and only died three hours later. It can, however, be definitely stated from previous scientific experience that consciousness would be lost immediately. All victims were killed by bullets discharged from a Luger automatic pistol of 0.9 mm. calibre. In no case were there more than two bullets used and in all cases the entrance wound was in the occiput or nape of the neck. The injuries produced varied considerably. In some cases a clean hole was blown out of the head in the exit wound. In others, there were found multiple splintered fractures, while in some the skull was so splintered as to leave it completely shattered. In those cases shot in the nape of the neck, either from the aim of the executioner or as a result of movement of the victim's head, the 1st cervical vertebra was found completely shattered. From the examination of the Caves and the condition of the wounds, it can

reasonably be assumed that the victims were shot from a distance of about 10 feet. The bullets were hard metal.

The different injuries can be explained by the condition of the skull and angle of fire. In normal bone and with a straight and undeflected bullet a clean hole might reasonably be expected to be blown out of the skull by the bullet finding its exit. When the bullet was deflected at the entrance wound by hitting the skull at an angle the injuries resultant would vary, dependent on the strength of the skull bones, from fissuring to a greater or lesser degree, to almost complete shattering and scattering of the skull fragments. In any case the bone damage would be severe. The track of the bullet, where possible to deduce, was in all cases upwards and forwards.

(10) *Remaining Points in Routine Examination.*—Owing to the processes of general decay no information could be obtained from the examination with regard to the complexion or with regard to previous injury or disease except in a few cases where such injury or disease affected bones, e.g. old fractures.

IDENTIFICATION.

While the examination of the bodies was going on the relatives of those known definitely to have been executed in the Caves and of those who were missing and presumed to have been shot in the Caves were instructed to submit a full and accurate description of the supposed victim. This description was first of all completed by the relative and was elicited by means of a questionnaire making reference to all the physical features of the individual—name, age, height, physique, occupation, teeth, hair, previous disease or injury, especially fractures, distinctive body marks such as tattooing, clothing and articles believed to be in possession of the victim. In this connexion it is interesting to note the large number whose only assessment of height was in degrees of comparison, i.e. tall or medium or small. The majority were unable to give the exact height of the relative. It is probably fair to say that this failing would be evident all over the world.

Several meetings were held and the relatives instructed in the completion of the questionnaire, e.g. dental condition of the victim, had he all his teeth, were they in good condition, and so on—if he had had dental treatment the name of the dentist. Samples of clothing and the handwriting of the victim together with a photograph were also asked for. When the questionnaire was submitted the individual was closely questioned by the police on the details as completed and submitted by the relative in order to check their accuracy and if possible to clarify those points submitted or elucidate further details.

From the examination of the victims a full description was recorded similar to that of the questionnaire. Each body was described in the greatest of detail and as accurate an assessment as possible of age, height and physique made. Clothing was carefully examined and the description of dress and its condition, style, colour, etc., carefully recorded. Makers' tags and laundry marks were looked for and recorded where found. The samples of clothing, etc., removed from the body were held with the full description of the body.

Thus two descriptions were obtained; that submitted by the relatives and that prepared from the examination of the body.

The descriptions of the corpses were grouped according to age (as estimated in the majority of cases in decades), height (within an inch or two), and profession where it was possible to assess.

The police grouped the descriptions similarly, except that with more definite and exact information they were able to restrict the size group, and rather than having a small number of large groups were able to have a total of 53 groups by age, height and profession.

The description of a body when received from the laboratory by the police would be compared with the description held by them within the group. From these the final identification could be proceeded with, e.g. if the description was received by the police from the laboratory of a man 5 feet 8 inches to 5 feet 10 inches in height, aged between 25 and 35 years, and an artisan as deduced from his clothing and with nothing particular on his person to identify him, the names of all victims held by the police and approximating to these assessments of height and age would be examined, and it is evident that the victim must be among these. The full particulars of these men would then be compared and all those not of the artisan class would be excluded thus reducing the field of possibles. Comparison would then be made of all the samples of clothing removed from the body and submitted by the relatives, and so on until the field was reduced still further by processes of elimination till it could be said with a fair degree of accuracy that this is the body of so and so. Having reached that point the family of the individual was called on and submitted to questioning by the doctor making the examination. If the details elicited by this further examination were compatible with those already found the relatives were then shown and asked to identify the sample of clothing and the various other articles recovered from the body. If this examination was satisfactory the relatives were next interviewed at the Caves and submitted to a final questioning by the Professor in charge of the examination and asked to identify the articles recovered from the body. If this examination was satisfactory only then was identification accepted as complete. One further step in the identification was viewing the body. Its value is, I think, extremely doubtful except that it might have been possible to recognize the individual. Still it might have been some satisfaction to the unfortunate relative and this step was only taken at their express wish.

All this procedure was not necessary in all cases as it was possible to identify 76 of the victims almost immediately from various articles found on the body, e.g. visiting cards. Much of the questioning of the relatives could be reasonably dispensed with in such cases.

Of the 335 bodies exhumed 322 have been definitely identified. The remaining 13 may or may never be so identified but their scientific description remains for all time. The questionnaires for these are not complete and for four there is no questionnaire at all.

The investigations were completed on December 22, 1944, that is, roughly six months after the commencement of the work. The actual exhumations were completed at the end of September. There is perhaps nothing original or outstanding in this identification except the magnitude of the task and the number of bodies identified. It was a colossal undertaking and well merits recording. In this connexion it may be of interest to know that of the original photographs only six copies were made and distributed as follows:— to His Holiness the Pope, the Sindaco of Rome (Prince Doria), the A.M.G. Governor of Rome (Colonel Poletti), Professor Ascarelli, who carried out the examinations, the A.M.G. Director of Public Safety (Lieutenant-Colonel Pollock), and to the *Archives* of the City of Rome. That set of photographs consisted of 32 plates. The four photographs illustrating this article are from a set chosen by the writer of which there are only two in existence. One in possession of the writer and the other presented by him to Professor Ascarelli.

One final point that struck one very forcibly in this identification. The amount of time and work spent on this task before completion of the work was colossal even allowing for numerous and frequent interruptions from hysterical relatives. Here is more powder for the guns of the advocates of universal recording of finger-prints. If the finger-prints of these victims had been recorded with the registration of their birth this task would have been completed in hours or days instead of in months. Unknown and unidentified bodies will continue to turn up as long as time lasts.

Examinations must continue as at present, but there is no reason why identification should rest on the sometimes uncertain results of such examinations when the solution is so simple and requires so very little extra in the present system of recording the birth of the individual. The universal recording of finger-prints has been advocated by many experts in the past thirty or forty years. It is to be hoped that this very desirable means of recording an individual will be accepted and implemented in the not-too-distant future.

MILITARY MEDICINE IN ITALY : Analysis of One Year's Work in a Medical Division.

BY

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Royal Army Medical Corps,

Officer-in-Charge of a Medical Division.

[Received April 29, 1946.]

THE opportunity has now arisen to copy the example of Bulmer (1943) [1] and Leishman and Kelsall [2] (1944) and to present an analysis of medical cases treated in a general hospital in Italy during 1944.

The hospital in question was until June, 1944, the most forward general hospital in the advance to Rome and, because of this, admissions were in the main direct from units in the field, i.e. field ambulances, dressing stations, and casualty clearing stations. This demanded that the hospital be primarily surgical, and a large number of the available beds was earmarked for this purpose. In the latter months of the year, as the front line moved farther forward, the hospital assumed the duties of a base unit, and the necessity for rapid disposal and evacuation in certain more chronic cases did not arise. At no time, however, did the Division become an evacuation centre for medical cases. Nevertheless, there were 11,364 discharges and transfers from the medical wards, and of these it is proposed to analyse 10,524.

TABLE I.—DISTRIBUTION OF DISEASE GROUPS (10,524 Cases)

Tropical diseases	4,097	(39.0%)
Infectious diseases	1,930	(18.3%)
Respiratory diseases	1,809	(17.2%)
Skin diseases	1,326	(12.6%)
Alimentary diseases	421	(4.0%)
Musculo-skeletal diseases	347	(3.3%)
Urogenital diseases	193	(1.8%)
Neurological diseases	174	(1.6%)
Mental diseases	142	(1.4%)
Cardiovascular diseases	70	(0.7%)
Endocrine and metabolic diseases	15	(0.1%)

10,524

TROPICAL DISEASES

TABLE II.—4,097 CASES.

A	No. of cases	% of all Malarias
Malaria—		
Benign tertian (P)	971	40.1
Malignant tertian (P)	30	
Quartan (P)	9	
Clinical	351	14.4
Benign tertian (R)	1,034	42.8
Malignant tertian (R)	19	
Quartan (R)	8	
	2,422	

B					No. of cases
Dysentery—					
Bacillary exudate ..	..	..	..	..	197
Indefinite exudate..	..	..	..	..	110
Clinical .. ..	..	..	..	..	56
					<hr/>
					363
Diarrhœa .. ..	..	..	..	..	572
					<hr/>
					572
Amœbiasis—					
Dysenteric .. ..	..	..	..	..	36
Hepatic .. ..	..	..	..	..	15
Abscess .. ..	..	..	..	..	2
					<hr/>
					53
Schistosomiasis ..	..	..	..	..	3
					<hr/>
					3
Short-term fevers ..	..	..	..	..	647
					<hr/>
					647
Helminthiasis .. ..	..	..	..	..	35
					<hr/>
					35
Typhus .. ..	..	..	..	..	2
					<hr/>
					2
					<hr/>
Total .. ..	..	..	..	..	4,097

The incidence of malária in the two halves of the year was much the same, with a high proportion of relapses. It is interesting to note that there was one case only of proven malignant tertian malaria in the latter half of the year, which is probably due to two factors: (1) that of the mepacrine prophylaxis, and (2) that the troops were seldom fighting in areas where this infection was endemic. The high proportion of clinical malaria (malaria diagnosed on clinical grounds only, without any laboratory confirmation) was due to the masking effect of prophylactic mepacrine, and a great percentage of these cases was diagnosed as such in the field and sent to hospital when the treatment was already initiated. In this respect one does not agree with Leishman and Kelsall, who deprecate this procedure. Early treatment in the field was demanded prior to movement to the back areas, in an endeavour to minimize the danger of any catastrophe *en route*. The numbers so diagnosed dropped considerably in the latter six months as the hospital assumed more and more the duties of a base unit, and there were only five cases in the last quarter.

There was seldom any indication to use intravenous quinine, and the majority of cases were treated by the standard quinine-mepacrine course (quinine 0.30 gramme daily for three days; mepacrine 0.8 gramme daily for two days, then 0.3 gramme daily for five days). Some of the frequent relapses of benign tertian malaria were treated with quinine-pamaquin for ten days (quinine 0.30 gramme daily; pamaquin 0.03 gramme daily). One interesting factor was that the general health of the men with relapses was excellent, and one seldom saw a man debilitated because of frequent malarial attacks.

There were few cases of chronic splenomegaly, and only one man was invalided to the United Kingdom because of this.

DYSENTERIES.

Bacillary Dysentery.—Bacillary dysentery never presented a real problem in the Division, and all cases seen were mild and responded adequately to treatment. In the main, sulphaguanadine was used, and there were no complications.

Non-Specific Diarrhœa.—The cases of non-specific diarrhœa were more of a problem because no cause was ever found. Repeated examination of the stools and mucus failed to reveal an organism, and invariably sigmoidoscopies were negative. As a general principle, patients were returned to their units with the suggestion that they should habituate themselves to three or four loose stools a day.

Amœbic Dysentery.—Considerable care was taken to exclude amœbiasis in all cases of dysentery, and repeated stool examinations and sigmoidoscopy were done in many cases; nevertheless, there were few proven cases of amœbiasis during the year. Provocative emetine was used as a diagnostic measure, but was not of great value, although I had previously used it to good account in Palestine.

SHORT-TERM FEVERS.

The expression "short-term" covers all fevers of a few days' duration for which no cause was found and in which laboratory investigations were uninformative. It includes a large group of cases which one might justifiably have called sandfly fever, as the phlebotomus fly was found in many of the buildings in the vicinity of the hospital, and as the clinical picture was a modification of the classical sandfly-syndrome seen in Palestine. Apart from a man-power wastage, this group presented no problem, and a rapid recovery to normal health was characteristic of the illness.

TABLE III.—ACUTE INFECTIOUS DISEASES (1,930 cases)

Disease	No. of cases
Acute rheumatism	36
Benign lymphocytic meningitis	14
Chickenpox	7
Diphtheria	318
Enteric group.. .. .	24
Erysipelas	6
Glandular fever	7
Infective hepatitis	1,482
Mumps	8
Poliomyelitis	11
Scarlet fever	7
Smallpox	3
Staphylococcal septicæmia	3
Streptococcal septicæmia	1
Tuberculous meningitis	1
Undulant fever	2

1,930

ACUTE INFECTIOUS DISEASES.

Infective Hepatitis.—This disease was a problem only by virtue of its number and the necessity for long convalescence, the average length of stay

in hospital being 22·1 days prior to going to the convalescent depot. In our cases the prognosis was almost uniformly good, which was in contradistinction to the neighbouring New Zealand and American hospitals, where the sub-acute and chronic manifestations of this condition were more common. Strict attention was paid to the clinical criteria for discharge to convalescent depot. These were: bile-free urine, good appetite with no indigestion, reasonable exercise tolerance, and normal liver from the point of view of tenderness and enlargement. In the majority of cases there was no indication for any laboratory investigation either to determine the line of treatment or to establish a prognosis. In the more prolonged cases, however, it was found that a microcytic anæmia developed, and occasionally plasma proteins were found to be low, together with persistently raised serum bilirubin.

A difficult problem was created by a group of men reporting sick with vague intestinal symptoms which they stated had commenced after an attack of infective hepatitis and, in these cases, it was difficult to determine to what extent the symptoms had an organic basis. There were no informative laboratory tests of liver function, although many were tried, including cephalin flocculation and brom-sulphthalein retention. Unfortunately, liver punctures were not done, as this procedure would seem to be the best help in this clinical exercise.

It is interesting to note that out of 700 cases in the last six months of the year, not one was invalided to the United Kingdom, and only one Canadian was transferred to a Canadian hospital for evacuation.

A small series was treated with dried skimmed milk (150 grammes daily) in addition to the fat-free diet, and it was found that there was no demonstrable difference in the clinical progress of these men. Neither were we able to persuade the British soldier to tackle the gargantuan meals which our American colleagues placed before their men. In one officer who was extremely ill and exhausted as the result of persistent vomiting, an estimation of plasma protein gave a definite subnormal figure. In this case the administration of serum was accompanied by a definite improvement in his general condition, and from then on he made an uneventful recovery.

Diphtheria.—There was a marked reduction in the hospital admission of this disease in the second half of the year, when the line troops moved forward. The main essentials of treatment were early and large doses of serum and strict but *comfortable* rest in bed for a minimum of four weeks. A careful watch was established for *any* evidence of paresis, and a thorough overhaul was effected after six or seven weeks, prior to transfer to a convalescent depot.

The few cases of polyneuritis seen during the year were all admitted from outside or through the Out-Patient Department, and the complications seen in the ward, e.g. transient diplopia, dysphagia and tachycardia, were of short duration and the patients recovered completely.

Smallpox.—Only three cases of smallpox were seen in the hospital during the year, and they were all transferred to a nearby smallpox wing. The patients concerned were treated with a combination of parenteral penicillin and sulphathiazole, and made good recoveries. Lieutenant-Colonel Fleming.

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R.A.M.C. GOLFING SOCIETY AUTUMN MEETING
WEDNESDAY 9th OCTOBER, 1946.

at

THE HILL GOLF CLUB, BROOKWOOD, SURREY.

The Autumn meeting of the R.A.M.C. Golfing Society will be held on Wednesday, 9th October at the West Hill Golf Club, Brookwood, Surrey.

It is hoped that many members, new and old, will make this most dry off from the daily grindstone. They will be indeed welcome to this well known Corps occasion for golfers and by their presence will bring success and good cheer to us all.

The enthusiasm and leading given by the President of the Society our Director General, Lieut. General Sir Alexander Hood in restarting the post-holm meetings, of which this will be the second one, very well be related by those golfers in the Corps who have also found health and good cheer in the Royal and Ancient game and who in spite of those lean years are anxious to catch a glimpse of happier and expansive days ahead when fairway and rough will again be ours in full measure. ... scores will be shorter and drives longer!

EVENTS:

Morning: The Autumn Challenge Cup: 18 holes medal play under handicap. Winner holds the cup for one year. Prizes also go to the winner and runner-up, while a Society prize is also awarded for the best scratch score.

Afternoon: Handicap singles against boys: prizes for winner and runner-up.

Optional Strokeplay: These can be entered for, for both events.

Time of play: is ending, 11.30 a.m.

(2)

Caddies: Members notify their names on the entry form. Caddies are limited but the Secretary, West Hill Golf Club says he will obtain these if told early, hence the need to get Entry forms in early. The charge is 15/- including tip and lunch tip, and is an individual responsibility with the caddy master at the meeting. A booked study has to be paid for, even if the Competition scratches at the last moment, as caddies come from other courses for our meeting.

Now to get to West Hill Golf Course, Brookwood, Surrey: This is on the rail line from London through Clapham, Weybridge, Woking to Brookwood. The Golf course is just beside the railway station and connects by a path to path.

Trains from London:-

<u>Depart Wat. loc.</u>	<u>Arrive Brookwood.</u>	<u>Depart Waterloo.</u>	<u>Arrive Brookwood</u>
7.55 a.m.	8.54 a.m.	12.17 p.m.	1.11 p.m.
8.25 a.m.	9.15 a.m.	12.54 p.m.	1.34 p.m.
8.55 a.m.	9.25 a.m.	12.57 p.m.	1.45 p.m.
9.27 a.m.	10.15 a.m.	1.17 p.m.	2.15 p.m.
9.54 a.m.	10.45 a.m.	1.54 p.m.	2.34 p.m.

Kindly check times as these are present times (August).

Re-booking. Owing to rather stringent the West Hill Golf Club committee regret that they can only provide liquid refreshments of beer, wine and ale that we bring a sandwich luncheon and car box, although if desired rationing is on then they might be able to help with this. Your Society Committee appreciates this generosity but knew that there will be no advantage to our members who will also be considered a real step.

Mr. Deane, the well known lecturer. Between the two parties were about 150 and recent Stirling meeting, and among the guests were - Lady Egan, Mrs. Blake, Governor Alexander, and their guests and a great joy to us all. We remember a non-players had too together after the match at the North Hants Golf Club and all enjoyed this party gathering. On such an occasion in 1937 we recall, too, Major General "Sandy" Fraser winning his first golf cup ever and filling this with bubbling nectar and passing round the loving cup. Changed days these, but better times are coming. Let this Wednesday the 9th October be a precursor, however different.

The R.A.M.C. Ladies Golfing Society, which used to hold a meeting concurrently with ours on occasions is not yet going but the Lady Hartigan challenge bowl now held by Mrs. Rudkin will one day again be the centre of competition and we give the golfing ladies of the Corps our welcome and good wishes in their future meeting, which Mrs. Walker and Mrs. Stevenson, present and past secretaries, are now conferring about.

Appreciation: All Corps golfers - yes and many non-golfers also - will wish our previous Hon. Secretary Brig. D.C. MONRO all happiness and success in Egypt where he has been posted. Our Society was indeed fortunate to have had "Jock" Monro as Secretary before and just after the War. His glad touch of efficiency and helpfulness which he brings to bear on work and play alike, made this old world feel a better place. The Society wishes Brigadier and Mrs. Monro good fortune and good scoring in Sunnier Climes.

(T. I. DUN)
Colonel,

Colonel,
Military Hospital for Head Injuries,
Wheatley, Oxford.
August, 1946.
Tel No: Oxford 4,8678.

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in whose care these patients were, was kind enough to allow us to see them, and it was interesting that in these cases, where pustulation was severe, there was little or no residual scarring.

Anterior Poliomyelitis.—Eleven cases were seen during the year, with four deaths. They presented similar pictures to those seen previously in the Middle East. In all cases there was evidence of some mental disturbance such as restlessness, irritability, and temperamental instability, and in all cases some degree of paralysis was noted. During the same period 14 cases of benign lymphocytic meningitis were seen, and the two groups of cases were analysed. We found that examination of the cerebrospinal fluid and the differential white-cell count did *not* reveal any diagnostic pointer, and that painful muscles or muscle groups, together with paralysis, were the only real confirmations of diagnosis. As a result, we were not prepared to state that we saw any cases of abortive poliomyelitis. A more detailed account of this review will be published shortly.

TABLE IV.—RESPIRATORY DISEASES (1,809 cases)

<i>Disease</i>	<i>No. of cases</i>	<i>% of all respiratory diseases</i>
<i>Acute diseases (81.7%)</i>		
Acute bronchitis	238	13.0
Atypical pneumonia	294	16.0
Broncho-pneumonia	25	1.3
Lobar pneumonia	58	3.2
Coryza	196	9.2
Tonsillitis and quinsy	721	39.0
	1,532	
<i>Chronic diseases (14.7%)</i>		
Broncho asthma	16	0.8
Chronic bronchitis	83	4.5
Diseases of pleura	55	3.0
Spontaneous pneumothorax	8	0.4
Pulmonary tuberculosis	41	2.0
Miscellaneous	74	4.0
	277	
Total	1,809	

RESPIRATORY DISEASES.

If we include tonsillitis and quinsy within this section, it will be seen (Table IV) that a large proportion of the respiratory diseases treated during the year was acute, and was seen, in the main, in the first six months, when the front line was much closer to the hospital.

The cases of atypical pneumonia conformed to the picture that has been described by Turner [3] in his recent article. Lobar pneumonia, as such, was not common, and responded well to the sulphonamides, in marked contrast to the cases of atypical pneumonia. A small series of spontaneous pneumothorax was seen. The cases all did extremely well and were returned to duty in a lower category, with the exception of a bilateral spontaneous pneumothorax who was invalided home.

In our series of cases there was a marked disproportion between the acute and chronic groups of disease, which is very different from the figures of Bulmer and Leishman. This is reflected in the figures for evacuation to the United Kingdom, when 29 respiratory cases only were returned home on the basis of a 90 day hospitalization expectation. Of these, 20 were pulmonary tuberculosis and 8 were cases of pleural effusion.

Although the figures are not available, the impression was that the number of men with chronic bronchitis who were seen in the "Out-Patients" was less than in the Middle East, with a corresponding decrease in the necessity to down-grade.

GASTRO-INTESTINAL DISEASES.

This disease group presented its usual problems and was responsible for the evacuation to the United Kingdom of more patients than any group except the respiratory diseases. The number of cases of peptic ulceration is appreciably lower than noted either in the Middle East or India.

During the summer months a group of cases was seen with the following picture: acute gastro-intestinal upset with twenty-four to seventy-two hours fever, upper abdominal pain and tenderness, malaise and anorexia, with or without diarrhoea. These cases were diagnosed severally as acute dyspepsia or acute enteritis, and in the majority of cases cleared rapidly. Some persisted to the extent that the diagnosis of subacute cholecystitis was entertained.

There were few comments in the records of liver enlargement or tenderness, but this was noted on occasion, and there was no indication of biliruria. When these cases were reviewed, we wondered whether some of them might have been examples of infective hepatitis *sine* jaundice.

TABLE V.—GASTRO-INTESTINAL DISEASES (421 cases).

<i>Disease</i>	<i>No. of cases</i>
Carcinoma, stomach	1
Cholecystitis	8
Duodenal ulcer	26
Dyspepsia	204
Gastric ulcer	8
Gastritis, acute	94
Gastritis, chronic	14
Hæmatemesis	3
Miscellaneous	63

Total 421

It was possible to estimate the average length of stay in hospital of certain diseases:—

Diphtheria	50.52 days
Malaria	11.44 ..
Diarrhoea	11.4 ..
Bacillary dysentery	17.77 ..
Infective hepatitis	22.1 ..

All cases of diphtheria were transferred to a convalescent depot, as were the majority of infective hepatitis patients. During the months April-June, the bulk of the malarias went to convalescent depot on the last day of their

mepacrine administration with instructions that pamaquin be given according to the prescribed routine, but this was stopped when the treatment was adjusted.

The one surprising figure was the apparent bed wastage due to diarrhoea; this was not due to the whim of any one medical officer, as three officers controlled the ward during the year and the quarterly figures remained remarkably constant. The fact that sigmoidoscopy and repeated stool examinations were carried out in most cases accounts in part for the lengthy stay.

DERMATOLOGICAL DISEASES.

Because there was no detailed analysis of dermatological cases for the first three months of the year, it is impossible to give an accurate survey of the distribution of this disease group. A total of 1,326 cases was seen during the year, and the following table shows the numbers of some of the more common diseases (out of a total of 767) treated in the last three quarters.

TABLE VI.—DERMATOLOGICAL DISEASES

<i>Disease</i>	<i>No. of cases treated in the last 3 quarters</i>			
Dermatitis, acute	31
" contact	36
" infective..	53
" seborrhœic	42
" sulphonamide, light	21
" sulphonamide, seborrhœic	21
Ecthyma	46
Epidermophytosis	12
Furunculosis	92
Impetigo	105
Psoriasis	23
Scabies	69
Tinea feet	63
Urticaria	23

637

Penicillin was used in the latter part of the year both in cream form and parenterally. Cases of impetigo and sycosis barbæ responded well to the application of the cream (250 units per c.c.), but parenterally penicillin seemed to be of little use in infected tinea or sulphonamide light dermatitis. In furunculosis the crop of boils cleared rapidly with penicillin administration, but often reappeared after a short time, and in the other conditions the penicillin appeared to assist the clearance of the secondary infection, but nothing more.

ANALYSIS OF CASES EVACUATED TO THE UNITED KINGDOM.

Detailed figures are only available for the latter six months of the year, when the criterion fixed was a minimum of ninety days hospital expectancy.

During this period, 16 officers and 90 other ranks were returned, out of a total of 4,961 patients discharged from the Division, i.e. 2·13 per cent. The figures presented do not call for any particular comment.

TABLE VII.—CASES EVACUATED TO THE UNITED KINGDOM BETWEEN JULY AND DECEMBER, 1944 (INC.) (106 cases).

<i>Disease</i>	<i>No. of cases</i>	<i>Disease</i>	<i>No. of cases</i>
Amœbiasis (1)—		Neurological (13)—	
Amœbic hepatitis	1	Epilepsy	1
Arthritis (5)—		Hypertensive encephalopathy ..	1
Arthritis, inf.	3	Sciatica	5
Spondylitis ankylopoietica ..	2	Disseminated sclerosis	2
Cardiovascular (9)—		Ac. ant. poliomyelitis	2
Chr. endocarditis, dilatation of 1st part of aorta	1	Myotonia atrophica	1
Essential hypertension	1	Contusion lower cerv. cord (C 6-8)	1
Ac. myocarditis	1	Respiratory (29)—	
Pericarditis with effusion	1	Pleural effusion	8
Mitral stenosis	2	Pneumothorax, spont. (bilat.) ..	1
Effort syndrome	1	Pulmonary tuberculosis	20
Thrombo-angiitis obliterans	1	Urogenital (8)—	
Vaso-vagal attacks	1	Renal calculus right hydronephrosis	2
Dermatological (15)—		Hydronephrosis left	2
Dermatitis cont. s/mide	3	Ureteric calculus	2
„ rec. s/light	4	Ac. nephritis	1
„ cont. textile	1	Chr. nephritis	1
„ inf. ecz.	2	Miscellaneous (11)—	
Severe chr. furunculosis	1	Addison's disease	1
Lupus erythematosum	1	Intermittent claudication	1
Psoriasis	1	Diabetes mellitus	2
Chr. inf. tinea feet and hands ..	2	Simple goitre	1
Gastro-intestinal (15)—		Toxic goitre	2
Carcinoma stomach	1	Gonorrhœa rsd. meningo-vascular	
Duodenal ulcer	9	syphilis	1
Dyspepsia, duodenal	1	Staphylococcal pyæmia	1
Dyspepsia, functional	1	Subarachnoid hæmorrhage	1
Gastritis N.Y.D.	1	Varicose veins	1
Hepato-splenomegaly	2		

SUMMARY

<i>Disease group</i>	<i>Number of cases</i>	
	<i>Officers</i>	<i>Men</i>
Amœbiasis	1	—
Arthritis	2	3
Cardiovascular	1	8
Dermatological	1	14
Gastro-intestinal	5	10
Neurological	4	9
Respiratory	2	27
Urogenital	—	8
Miscellaneous	—	11
	16	90

TABLE VIII.—DEATHS.

January to December, 1944 (inc.)					
Anterior poliomyelitis .. .. .	..	..	..	..	4
Subarachnoid hæmorrhage .. .. .	..	..	..	..	2
Staphylococcal septicæmia .. .. .	..	..	..	..	2
Typhoid .. .. .	..	..	..	..	2
Tetanus .. .. .	..	..	..	..	1
Tuberculous meningitis .. .. .	..	..	..	..	1
Hæmolytic strep. septicæmia .. .. .	..	..	..	..	1
Coronary thrombosis .. .. .	..	..	..	..	1
Pulmonary infarction .. .. .	..	..	..	..	1
Lobar pneumonia .. .. .	..	..	..	..	1
Hepatic abscess .. .. .	..	..	..	..	1
Chronic hæmatemesis gastric ulcer .. .. .	..	..	..	..	1
					—
					18

SUMMARY.

Some of the most interesting points revealed by the year's work were :—

- (1) The large proportion of relapses of benign tertian malaria.
- (2) The high incidence of infective hepatitis with its good prognosis ; the strict criteria adopted to transfer to a convalescent depot.
- (3) The pursuance of conservatism in the treatment of diphtheria, and the absence of sequelæ in the cases under our care.
- (4) The increased incidence of acute respiratory disease compared with the figures for the Middle East and India.
- (5) The difficulty experienced in the *early* diagnosis of anterior poliomyelitis when compared with cases of benign lymphocytic meningitis.
- (6) The value of penicillin in dermatological cases.

COMMENT.

This analysis of facts calls for little comment ; in addition to this work within the Division, we were permitted to supervise the many medical complications of battle casualties, and at battle periods the physicians spent an appreciable portion of the day in the surgical wards. In this respect I would like to offer my personal thanks to Lieutenant-Colonel D. W. Jolly, *O.B.E.*, *R.A.M.C.*, Officer in Charge of the Surgical Division, who gave us free entry into his Division, and to Major W. R. Trotter, *R.A.M.C.*, and the other officers in my Division for their loyalty and hard work during my stay with them. Finally I wish to thank Colonel R. W. Savage, *O.B.E.*, *M.C.*, for his permission to forward this article.

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Clinical and Other Notes.

**A CASE OF BILATERAL CONGENITAL HYDRO-URETER
AND HYDRONEPHROSIS.**

BY

Major D. P. BURKITT,
Royal Army Medical Corps, Surgical Specialist,

AND

Major H. J. HAMBURGER,
Royal Army Medical Corps, Surgical Specialist.

[Received May 21, 1946.]

CONGENITAL abnormalities affecting the urogenital system are not uncommon. The large majority of these are vesical or supravescical lesions which is understandable in view of the embryology of the urogenital tract. They result from abnormal or additional outgrowths of the mesonephros or from faulty fusion of these with the metanephrogenic cap.

Infravesical lesions are rare and their pathology appears to be somewhat obscure. They are in the nature of obstacles to the discharge of urine in contradistinction to suppression of renal secretion. This obstruction to urinary discharge can be explained by mechanical blockage or neuro-muscular disturbance. It is a characteristic feature of the greater number of these cases that, even when of a mechanical nature, instruments can be passed into the bladder with ease [1]. This suggests an urethral obstruction of valvular nature. Various authors have attributed the obstruction to partial or complete septa, valves in the posterior urethra, or phimosis [2]. It had been observed that the valves are usually stretched between the verumontanum and the wall of the posterior urethra. Congenital hypertrophy of the verumontanum has also been described [3, 4]. In several cases it has not been possible to find an anatomical basis for the obstruction at post-mortem examination. These cases are probably due to a disturbance of nervous mechanism either centrally or peripherally, causing spasm of the bladder sphincter [5]. Such cases have been found associated with Hirschsprung's disease [6]. The obstruction to the urinary outflow causes bladder distension and hypertrophy which eventually leads to incompetence of the ureterovesical sphincters and results in dilation and hypertrophy of the ureters and renal pelvis.

The following case of congenital bilateral hydro-ureter and hydronephrosis is reported.

A Chinyanja speaking "askari" (African soldier) of about 23 years of age was admitted to the Surgical Division of an Indian General Hospital (Combined), complaining of hæmaturia. It was impossible to obtain a full and accurate history owing to language difficulties and the fact that the patient's recollections of earlier events were very vague. When questioned he stated that he had had difficulties with micturition as a small boy. He first reported sick with hæmaturia three years previously and had had intermittent attacks ever since.

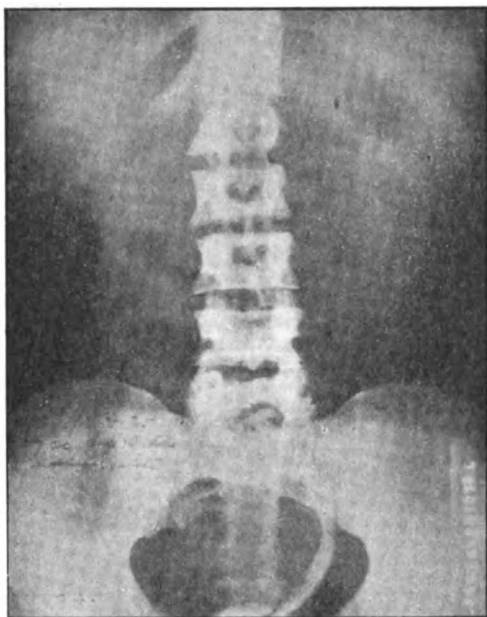


FIG. 1.—Dilated right ureter just visible on tips of transverse processes.



FIG. 2.—Intravenous pyelogram. Bilateral hydro-ureter and hydronephrosis.



FIG. 3.—Dye injected to bladder and flowing up ureter.

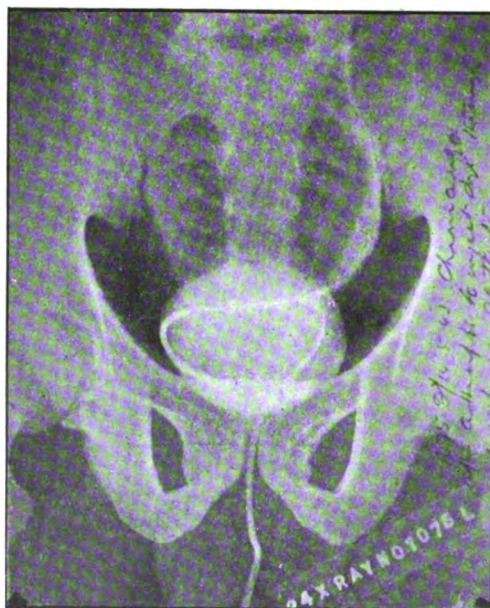


FIG. 4.—Dye injected through ureteric catheter.

Nothing abnormal was revealed on clinical examination. Blood-pressure was 120/60. The urine contained a trace of albumin and some red cells. Cultures were sterile. As painless hæmaturia in Africans always arouses suspicion of bilharzia a series of urine specimens were searched for schistosoma ova, but with negative findings.

The blood urea was 22 mgm. per 100 c.c.

Cystoscopy: Bladder capacity about 10 oz. Mucous membrane normal. Marked hypertrophic trabeculation of the bladder wall. Both ureteric orifices were wide and gaping to the size of a No. 10 catheter. Little peristalsis of ureters observed.

Straight X-ray showed the shadow of what appeared to be a grossly hypertrophied right ureter opposite the fourth and fifth lumbar vertebræ (fig. 1).

Intravenous pyelogram revealed marked bilateral hydronephrosis and hydro-ureter, with good secretion and concentration on both sides. A constricted segment was observed in the left ureter opposite the bodies of the fourth and fifth lumbar vertebræ (fig. 2).

Retrograde Pyelogram.—The cystoscope was passed with ease and a ureteric catheter introduced into the left ureter to 6 cm. where it stopped. 4 oz. of sodium iodide were injected into the bladder through the cystoscope. X-ray showed the opaque fluid flowing up the left ureter (fig. 3). It is not clearly understood why the dye entered only the left ureter but it is probably due to the presence of the catheter. Sodium iodide was then injected into the ureter but did not rise above the constricted segment (fig. 4). A single catheter cystoscope only was available.

The majority of these cases are believed to die in childhood. The patient under review has reached adult life and does not appear to suffer from any severe renal damage.

Our thanks are due to Colonel Langford for permission to forward this case.

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POLIOMYELITIS IN SINGAPORE.

(A precis of a report by Dr. A. M. MacFarlan of the Medical Research Council made to D.M.S., Medical Division, SACSEA. Forwarded April 4, 1946.)

WHEN the Allies re-entered Singapore in September, 1945, they found gross insanitary conditions but little destruction of the city. During the next three months the civilian population increased by some 2,000 a week due to immigration. In January, 1946, five unconnected cases of poliomyelitis were reported in Chinese children on the Island and the possibility of an epidemic was recognized. Prompt measures in the way of propaganda, search for early cases and improvement of sanitation were undertaken. In spite of this over 180 cases of poliomyelitis with 18 deaths occurred from December 23, 1945, to March 23, 1946.

INCUBATION PERIOD AND CLINICAL FEATURES.

The incubation period was probably between 8 and 14 days. An analysis of 106 civilian cases showed the type of paralysis to be as follows:—

Lower and upper limbs	..	24	per cent
Lower limbs only	.. ..	48	" "
Upper limbs only	.. ..	15	" "
Bulbar type	.. ..	13	" "

Many civilian cases showed signs of meningitis at the onset and the higher incidence of bulbar paralysis in Singapore than in Mauritius (13 per cent versus 2 per cent) suggested that the virus had frequently entered the body by the tonsils or pharynx. In 10 out of 24 Service cases there was involvement of the medulla and cervical enlargement of the spinal cord and in only 14 Service cases were the lower limbs involved.

EPIDEMIOLOGY.

(a) *Attack and Fatality Rates.*—In an estimated civil population of 889,000 there were 137 cases (0.15 per thousand) with 6 deaths (4.5 per cent). In children under 10 years of age, the attack rate was 0.51 per thousand (126 cases in 247,000 children). Thus, attack rates were lower than the two or three per thousand recorded in other epidemics, suggesting that the population was relatively immune. There were 50 cases in Service personnel (about 0.3 per thousand) with 12 deaths (25 per cent).

(b) *Age Incidence.*—In civilians 90 per cent of the cases were in children under 5 and only 1.5 per cent in persons over 15 years, which suggested the outbreak was a flare-up of an epidemic disease. The high incidence among adults in the Services is even more striking when compared with this low incidence in adult civilians.

(c) *Racial Incidence.*—Civilian cases occurred among all races, roughly in proportion to their numbers in the population at risk. All the Service cases were Europeans. Indian troops, though as numerous, were not affected.

(d) *Sex Incidence.*—Among civilian cases males were twice as numerous as females. In the Services, the incidence was higher in females than in males.

(e) *Course of the Epidemic.*

TABLE I.—NUMBER OF CASES WITH ONSET IN EACH WEEK.

		Week ending												
		Dec.	January				February				March			
		29	5	12	19	26	2	9	16	23	2	9	16	23
Civilians	..	1	5	3	12	16	22	24	21	13	14	1	4	1
Services	..	—	—	1	2	3	11	9	5	3	5	7	3	1

This table shows the course of the epidemic in civilian and Service personnel. The main part of the epidemic occupied seven weeks from January 13 to March 2.

(f) *Origin of Epidemic.*—Following a cold spell at the end of 1945, upper respiratory infections were common, both in civilian and service personnel, but no undue prevalence of diarrhoeal disease occurred. It appeared probable that an endemic "Singapore strain" of poliomyelitis virus became more virulent as a result of passage from throat to throat and that the civilian epidemic was the result of the interaction of this more virulent strain with a

relatively highly immune community. The Service cases were probably a "spill over" from the civilian epidemic.

(g) *Mode of Spread.*—The symmetry of the epidemic curve in civilians suggested a spread by contact rather than a mass infection by contamination of water or by a common article of diet. Though cases occurred throughout the Island, the main incidence amongst civilians was in the thickly populated part of the city. Almost all the Service cases occurred in different units and principally in those located in the town of Singapore. These factors further suggested a spread by contact and many carriers must have been concerned. Direct case to case contact was rare, however, and the evidence favoured a spread from secretions rather than from faeces. There was no evidence that flies played a part.

A CASE HISTORY OF EXFOLIATIVE DERMATITIS WITH COMPLICATIONS.

BY

Captain L. SEFTON,

Royal Army Medical Corps.

[Received May 15, 1946.]

THE following case of exfoliative dermatitis with complications occurred in a P.O.W. Hospital in Singapore, and is thought worthy of record on account of the grossness of the lesions and as displaying the tenacity and resiliency of the human frame; the successful conclusion was entirely dependent upon the extreme "will-to-live" of the patient, and the enthusiasm and care on the part of the Orderlies.

The patient was a man aged 46.

20.10.43: Transferred from Medical Ward to the Skin Ward today, when I saw this case for the first time; placed on D.I. list.

History.—Admitted to Medical Ward March 13, 1943, with "Debility." Had lost four and a half stone in weight in three months. Developed scabies. Treated in the Medical Ward with derris root solution; had twenty applications on and off, last one on May 25. Developed dermatitis of abdomen and thighs after this. Then developed pustular condition of hands during June and July. Skin gradually became eczematized.

Two months ago, eczematized skin started to flake off gradually, in thin flakes, and flexures began to crack. Much desquamation. Two weeks ago, the present gross and massed, matted, scaly condition started.

One week ago, pressure sore of coccyx. Pressure sore both ankles, and a lesion on scrotum.

PAST HISTORY.—Malaria as a child. No beri-beri. No dysentery. No diphtheria. No previous skin trouble. No arsenical injections.

Symptoms.—Feels very ill. Cold. No paræsthesiæ. No itching. Unable to move any joints of upper and lower limbs. Completely immobilized, owing to splinting by the very thick plating of scales.

ON EXAMINATION.—(1) General condition. Very wasted, drowsy, very weak, cannot roll over, dreadful odour. Throat and nose, N.A.D. Teeth, good. No glossitis. No stomatitis. Lower lip, superficial ulceration and impetiginization.

(2) Heart. A.B. not palpable, heard in 5th space $\frac{1}{2}$ inch internal to nipple line. Pulse rate, 100. Blood pressure not possible to take, owing to pellicle on limbs.

(3) Lungs. N.A.D.

(4) Abdomen. N.A.D.

(5) Scrotum. Centrally a scaly crust. Superficial ulceration right side, covered with a filmy, white adherent membrane, clinically diphtheritic. Culture :—K.L.B. present.

(6) Exfoliative dermatitis. The whole body from scalp to toes was covered with scales except nose and "butterfly area" of face, buttocks, and lower abdomen. In these *scaleless* areas, the skin was subacutely eczematized-red, œdematous, dried vesicles and serum. Face and scalp showed a fine, branny desquamation. Arms and legs *completely* covered by thick heaped-up matted scales, forming a complete pellicle one third to half an inch thick, including all fingers and toes. The shoulders were covered by a layer half to three quarters of an inch thick. At the flexures the covering was cracked. Soles of feet clear on the inner side, for an area four by three inches. Chest and abdomen (except lower quarter of abdomen) covered by a complete pellicle of dried and matted scales, one sixth of an inch thick in most places, but in some areas the ordinary scaly condition of exfoliative dermatitis was seen. The very thick covering on arms and legs was softish and fairly easily picked off by forceps, or by blunt dissection, leaving an eczematized condition underneath.

(7) Impetiginization of ears and the fissures on extensor aspects of elbows and knees.

(8) Ulcers : (a) Bed sore over coccyx one by two inches, clean and deep. (b) Pressure sores right and left legs. Each showed an ulcer on external malleolus, and right in addition, an ulcer two inches above it. All ulcers one inch in diameter with dirty sloughing base and adherent membrane in patches. No red halo round ulcers but the characteristic smell of these clinically diphtheritic ulcers was present. Culture :—K.L.B. present in all ulcers.

Causation.—The condition was an exfoliative dermatitis secondary to a sensitization rash (or eczema) following a dermatitis probably due to derris root, complicated by scrotal diphtheria and cutaneous diphtheria supervening on pressure sores on legs.

Examination after scales removed.—No follicular lesions. No infiltration of skin. Central Nervous System :—N.A.D.

INVESTIGATIONS.

(a) Blood slides for malarial parasite. Negative.

(b) Urine. No sugar, no albumen, no deposits.

(c) Blood count. Hb. 86 per cent ; R.B.C. 4,400,000 ; W.B.C. total 9,400, Diff. P. 75 per cent, L. 14 per cent, M. 4 per cent, E. 6 per cent, B. 1 per cent. No primitive forms.

(d) Culture for K.L.B. Lower lip negative. Leg ulcers and scrotum K.L.B. present.

TREATMENT.

I.—General.

(a) Nursing. Isolation in Skin Ward. "Special" day and night Orderlies. Between sheets (a great luxury). Mosquito net day and night (to keep out flies as well as malaria parasites). Air-Ring. Heel and ankle rings. Hot water bottles. Cradle to keep clothing off body. No bathing. Shave head.

(b) Diet : Full, and such extras as were available (or could be spared from our very small and very carefully conserved hoard) ; especially protein (to replace protein loss in the scales).

(c) Red Palm Oil one ounce thrice daily (to supply fat).

(d) Marmite one ounce daily (to prevent Vitamin B₁ and B₂ complex deficiency).

(e) Ascorbic acid 3,000 units by mouth daily.

(f) No diphtheritic antitoxin was available.

II.—Local.

- (a) No soap or water. Clean de-scaled areas with Red Palm Oil.
- (b) Skin generally—
 - (i) Remove pellicle with forceps, a little each day, after softening with Red Palm Oil; then apply Calamine cream to dry areas and Calamine lotion to moist areas. No dressings.
 - (ii) Thin and dry scaly areas, (lower abdomen, etc.), Calamine cream.
 - (iii) Moist eczematous areas, Calamine lotion.
- (c) Impetiginized areas (ears, knees, elbows and lips), one per cent H.A.D. paste.
- (d) Bed sore on coccyx. Sulphanilamide paste and then strapping. Air ring.
- (e) Diphtheritic lesions on legs and scrotum, one per cent boric wet dressings on lint, kept moist day and night, the dressings being left *in situ*.

PROGRESS.

- 22.10.43 :—Feels well. Clinically diphtheritic membrane lower lip.
- 25.10.43 :—Feeling much better. Ulcers of legs and bed sore on coccyx cleaning well. Scrotum also cleaning well. Right arm and both lower legs clear of scales.
- 29.10.43 :—Pneumonia right base. Heart, triple rhythm; pulse 140. Sulphapyridine 0.2 gramme at once, then 1.4 gramme hourly.
- 30.10.43 :—Faint morbilliform rash and itching over abdomen. Possibly due to sulphapyridine, which stop.
- 3.11.43 :—Exfoliative dermatitis clear everywhere. All the ulcers nearly healed.
- 4.11.43 :—Lungs clear.
- 27.11.43 :—Skin clear all over and appears normal. All ulcers and bed sores healed. Walked ten yards with assistance.

He made an uninterrupted recovery and never looked back. There was no further exfoliation. Since then (last seen September 1, 1945), skin has remained clear apart from occasional attacks of “cheiropompholyx” of hands and feet; in this case an epidermophytide consequent upon interdigital tinea of his toes.

DEVELOPMENT OF THE STRETCHER BED (“HOLMAN”) AND ATTACHMENTS.

BY

Major A. J. LAWLOR, M.B.E.,
Royal Army Medical Corps,

[Received May 8, 1946.]

A previous article¹ describes the stretcher bed attachments devised by Lieutenant-Colonel M. S. Holman, R.A.M.C., which were used extensively by medical units in Burma. The following notes complete the story.

Prior to the “Holman” attachments being put forward, there had been much discussion as to the ideal type of light bed for use in forward medical units; many types, camp and other, had been put forward and rejected for various reasons, such as too complicated in design, not sufficiently robust for field use, too many spare parts, additional weight in already fully extended transport, etc.

It was considered that the “Holman” method of producing a reasonable bed for holding patients in forward medical units, by utilizing stretchers and locally available material, was sound. The disadvantages of the improvisation were that it necessitated modification to every stretcher used and the design

¹ *R.A.M.C. Journal*, June, 1946, p. 275.

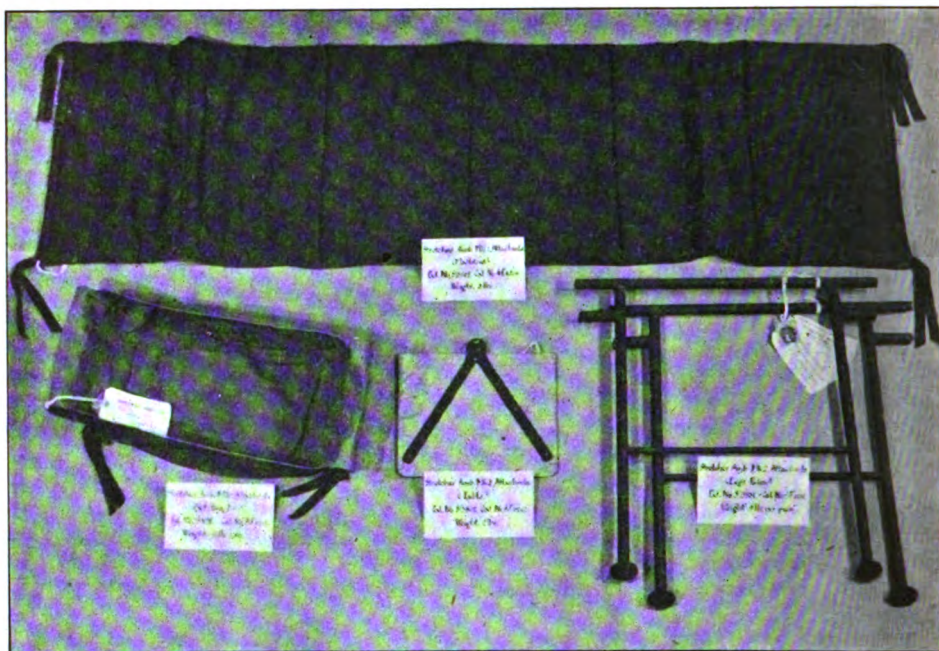


FIG. 1.—Dismantled stretcher bed attachments for Stretchers, Ambulance, Mark II, introduced into equipment scales after development of Lieutenant-Colonel M. S. Holman's original field improvisation plus a light mattress to take the "edges" off the stretcher.

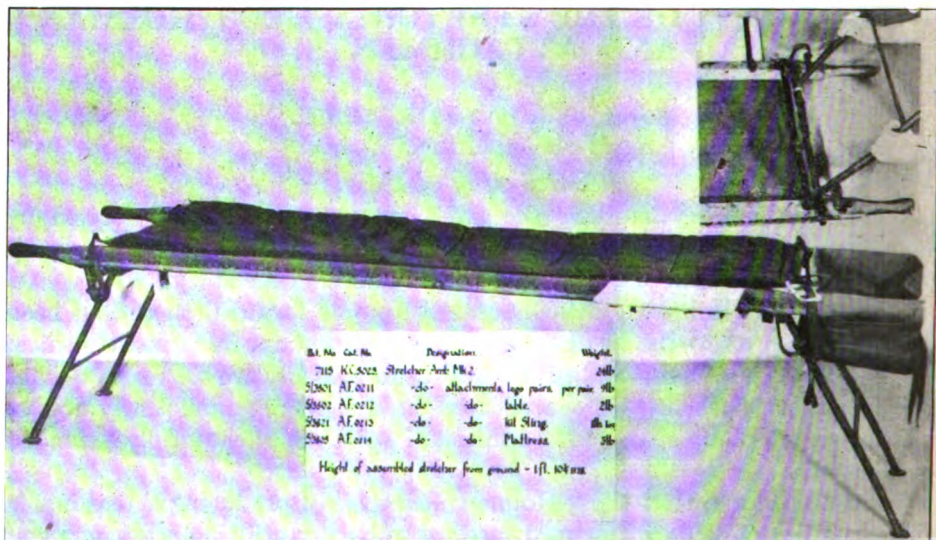


FIG. 2.—Stretcher bed and attachments developed from Lieutenant-Colonel M. S. Holman's field improvisation, assembled for use on Stretcher, Ambulance, Mark II.

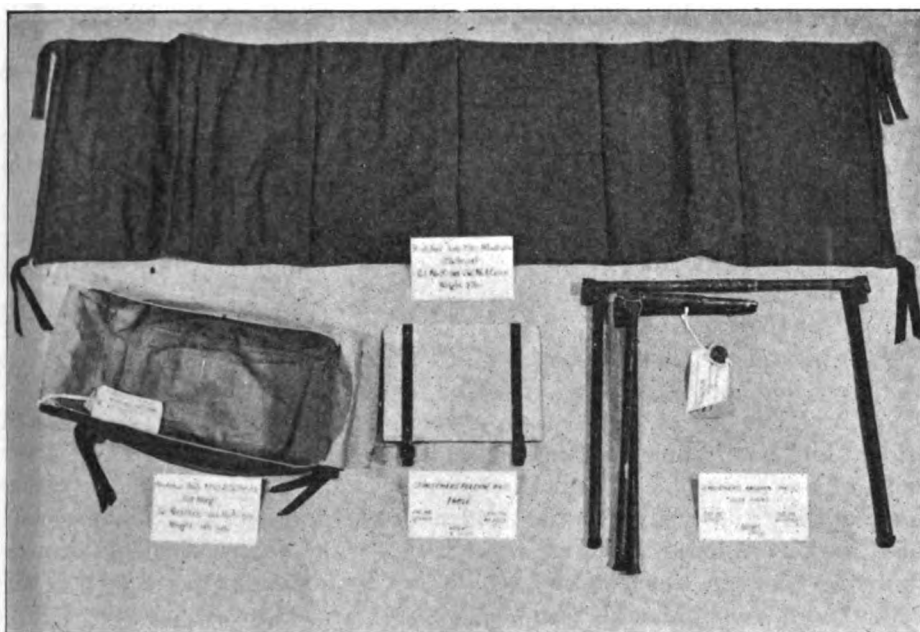


FIG. 3.—Dismantled stretcher bed attachments for Stretchers, Folding, Airborne.

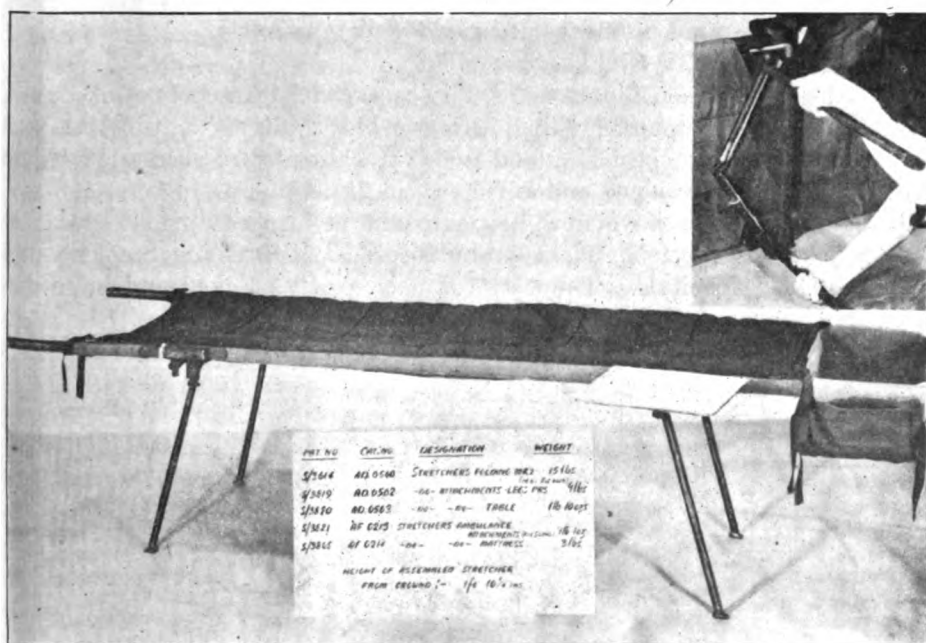


FIG. 4.—Assembled stretcher bed and attachments for Stretchers, Folding, Airborne.

was essentially unstable when brought up to a height of approximately 23 inches—desirable for nursing patients.

Samples of the "Holman" attachments were handed over to the Ordnance authorities with a request for the development of attachments to provide:—

(a) Detachable legs for Stretchers, Ambulance, Mark II, which could be attached without modification of the stretchers; would raise the stretcher to a height of approximately 23 inches from the ground, and remain stable at that height.

(b) A table on the lines of the "Holman" pattern but, again, requiring no modification of the stretcher for fixation.

(c) A kit sling.

(d) A mattress, light and compact, after the style of those used with camp kits, to provide additional comfort to the patients accommodated thereon.

The attachments developed were given field trials, modified as a result of criticism and finally approved for inclusion in War Equipment Scales. These finally approved attachments are shown in figs. 1 and 2. The metal legs can be affixed quickly and easily into the runners of any and every Stretcher, Ambulance, Mark II, allowance having been made for the degree of splay normally found in stretchers which have been in use for extended periods, are self-locking and have no movable parts.

The kit sling follows the design of the "Holman" pattern with the addition of a pocket at each side which can be used for documents whilst patients are retained. Although not designed for this purpose the kit sling could, if necessary, be used as a canvas wash basin.

The table is secured by means of two wing clamp screws.

The mattress is of layered kapok.

Both the kit sling and the mattress can be used with Stretchers, Ambulance, Mark II, and the Stretcher, Folding, Airborne, but, owing to the different construction of the latter, special leg and table attachments are necessary. These were subsequently developed and are shown in figs. 3 and 4.

These attachments have now been introduced into equipment scales of Casualty Clearing Stations, Field Ambulances, Field Dressing Stations and Light Casualty Hospitals. They are compact, easily stacked and have displaced the cumbersome trestles previously included in these scales.

DETAILS AND WEIGHTS.

STRETCHER, AMBULANCE, MARK II.

<i>Cat. No.</i>	<i>Designation</i>	<i>Weight</i>
A.F. 0211	Attachments, legs, pairs	per pair, 9 lb.
A.F. 0212	Attachments, table	2 lb.
A.F. 0213	Attachments, kit sling	1 lb. 1 oz.
A.F. 0214	Attachments, mattress	3 lb.

Height of assembled stretcher from the ground 22½ inches.

STRETCHER, FOLDING, AIRBORNE, MARK II.

<i>Cat. No.</i>	<i>Designation</i>	<i>Weight</i>
A.D. 0562	Attachments, legs, pairs	per pair, 9 lb.
A.D. 0563	Attachments, table	1 lb. 10 oz.

Height of assembled stretcher from the ground 22½ inches.

Correspondence.

P.O.W. CAMPS IN THAILAND.

TO THE EDITOR OF THE "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS."

DEAR SIR,—. . . I was a P.O.W. in Thailand and was with Captain Markowitz and Major Hazelton for quite a while, to whom I shall be forever grateful for all their attention. Especially to Captain Markowitz shall I be most grateful, for under his supervision I had seven blood transfusions at Nakon Paton in 1945 and I am certain that without them I would not be writing you this letter.

. . . In conclusion, may I say "Thank you" to the R.A.M.C. for their splendid work all through Thailand.

12, *St. George's Terrace*,
Roker, Sunderland,
Co. Durham.

June 16, 1946.

Yours most sincerely,

A. FRANK HARDY.

Reviews.

THE CAUSATION OF APPENDICITIS. By A. Rendle Short, M.D., B.Sc., F.R.C.S.
Bristol: John Wright & Sons, Ltd. London: Simpkin Marshall (1941),
Ltd. Pp. viii + 79. Price 10s.

Professor Rendle Short has taken up again in this monograph the much debated question of the causation of Appendicitis. He surveys the history of the disease, reaching incidentally the interesting conclusion that King Stephen "almost certainly" died of the disease in 1154. He then goes on to the Recent History of the disease, the Personal Ætiology and the National Distribution before taking up the relationship between Diet and Appendicitis.

In the majority of cases, he says, the proximate cause of acute attacks is not ascertainable, but he brings further evidence in support of his hypothesis, published in 1920, that a relatively less quantity of cellulose in the modern dietary, possibly linked with a vitamin deficiency, may be the Ultimate cause, whilst a diet rich in meat conduces to the disease.

The reviewer saw a very marked lowering of the incidence of Appendicitis among British prisoners in Japanese hands as compared with the normal in the Army on a full British diet. Prisoners of war had as their staple diet rice boiled in water to which were added coarse vegetables, likewise boiled, for the main meal of the day. There was a marked deficiency of protein and fat while the vitamin content was notably low, and it was very remarkable how very few cases of appendicitis occurred. The reviewer even got the impression that the disease became less frequent the longer the imprisonment lasted.

Professor Rendle Short has pursued his subject through a wide field and has included a list of references which will be useful to those who wish to study further this most interesting subject.

D. C. B.

CARDIOVASCULAR DISEASE IN GENERAL PRACTICE. Second Edition. By Terence East, M.A., D.M.Oxon., F.R.C.P.Lond. London: H. K. Lewis & Co., Ltd. 1946. Pp. x + 198. Price 12s. 6d. net.

Certain diseases of the heart appear to be becoming more troublesome as the stress and strain of everyday life increases. This makes it very necessary that we should keep ourselves *au fait* with the more established facts in cardiology and bring ourselves up-to-date with recent advances in cardiology. This small volume of under 200 pages provides the reader with the information required to keep him abreast of knowledge in cardiology.

It is unfortunate that publication takes so long nowadays for the statement that the treatment of bacterial endocarditis is unsatisfactory is undoubtedly due to the fact that the results of the recent work with penicillin had not become available before going to the printers.

These however are only minor points and do not detract from the usefulness of the book.

VENEREAL DISEASES IN GENERAL PRACTICE: With a Supplement on Penicillin, Mapharside, Sulphathiazole, etc. By Svend Lomholt, M.D., Copenhagen, M.D.(Hon.), Riga, O.B.E. London: H. K. Lewis & Co., Ltd. Pp. 234. Illustrations: 78 black and white, and 39 coloured on 16 plates. Price 25s. net.

This textbook is a revised English edition of a standard Danish work written by the Professor of Clinical Dermatology and Director of the Dermatological Clinic of the Finsen Institute at Copenhagen.

It was completed immediately prior to the war and was printed just before the German occupation of Denmark. Since then, it has not been wholly rewritten, but a Supplement on the Penicillin Treatment of Gonorrhœa and Syphilis, Mapharside, Sulphathiazole, Sulphadiazine and Intensive Arsenotherapy for Syphilis and fever treatment for Gonorrhœa has been added.

The difficulties occasioned by the rapid advances and shifting viewpoints in venereal disease treatment in the last ten years have to some extent marred all textbooks on the subject published during this decade. In this instance the same difficulties are apparent, perhaps more than usual, as most of the present-day standard treatments are included in the Supplement and much of the treatment described in the text is now out of date.

This is always understandable to the experienced, but the student reading the subject for the first time might carry away the impression that uleron and sulphanilamide are the best drugs for the treatment of gonorrhœa. Inclusion, too, of the renal complications of sulphonamides only in relation to the newer preparations described in the appendix leads the uninitiated to believe that this serious complication only occurs with the more modern drugs.

On the clinical side of the book one can give nothing but praise. It is excellently set out, with many striking photographs and most realistic coloured plates. It is attractively finished and presented, and does not suffer from the halting or bizarre phraseology which spoils many translations of foreign works. This work is recommended to both student and practitioner.

R. R. W.

THE PROBLEM OF LUPUS VULGARIS. By Robert Aitken, M.D., F.R.C.P.E., F.R.S.E. Edinburgh : E. & S. Livingstone, Ltd. 1946. Pp. viii+69 Price 15s.

This informative book presents the conclusions of the author's thirty years' experience and as such is a valuable contribution to the literature. The contents are extremely practical and the methods of treatment mentioned are those which have been tried and found to cure lupus vulgaris. A warning regarding the use of X-rays is given.

Ultra-violet radiation which includes the use of the Finsen-Lomholt lamp is described in detail and the value of the carbon arc in preference to the mercury vapour lamp is stressed. -

Although the modern tendency is to overlook tuberculin treatment, a number of interesting cases are presented which have been treated by tuberculin alone and in combination with U.V.L.

The final chapter deals with the social aspect of the lupus problem. Evidence is produced of the necessity for protecting the patient from the social ostracism which even to-day is ever apparent.

Perhaps the work being done with high dosage of calciferol will help to speed the day when this disease is no longer dreaded.

The book is easy to read and well illustrated, partly in colour. It should be read not only by dermatologists and tuberculosis officers, but also by physicians and senior students.

A TEXTBOOK OF THE PRACTICE OF MEDICINE. Seventh Edition. By various authors. Edited by F. W. Price, M.D., C.M., F.R.C.P., F.R.S.Ed. London : Geoffrey Cumberlege. Oxford University Press. 1946. Pp. xiv + 2033. Price 42s.

A Textbook of the Practice of Medicine, by various authors, edited by Frederick W. Price, has long held a high place amongst British medical textbooks. The seventh edition has been very thoroughly revised and contains all advances in our medical knowledge acquired during the last four years. There has been a considerable amount of useful re-arrangement of the articles in different sections; amongst these is the transfer of simple jaundice in infants, acholuric jaundice and family icterus gravis neonatorum from Diseases of the Liver to Diseases of the Blood.

Much entirely new material has been added. This includes, amongst others, articles on penicillin, primary atypical pneumonia, protruding intervertebral discs, the heart in beri-beri and psychopathic personality.

Much of the portions dealing with tropical diseases has been rewritten and brought up to date. This tropical disease section contains most of the essential information required by a doctor having to deal with tropical disease, bacillary dysentery, malaria, etc., Blackwater fever and mite typhus are diseases about which much new information has been acquired; this is well set out.

Price's Practice of Medicine cannot be too highly recommended to both graduates and under-graduates.

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LEPROSY. Third Edition. By Sir Leonard Rogers, K.C.S.I., C.I.E., M.D., F.R.C.P., F.R.C.S., F.R.S., I.M.S. (Retired) and Ernest Muir, C.I.E., M.D., F.R.C.S. Edin. Bristol : John Wright & Sons, Ltd. Pp. xii + 256. Price 25s.

This book has now passed into the third edition. The appearance is very timely as with the population and troop movements which have taken place as the result of war conditions the occasional case of Leprosy has become more common in this country. It is well that this be borne in mind especially in the diagnosis of dermatological and neurological conditions.

The many aspects of the subject are well covered and additions have been made to the sections on Prophylaxis, Ætiology, Clinical aspects and treatment. The Lepromin test and method of preparation of the antigen are described in detail and the authors' interpretation of the results summarized. Also a description is given of the testing and evaluation of new drugs more recently used in the treatment of Leprosy.

There are 32 pages of instructive illustrations at the end of the book, and in a future edition a few more micro-photographs suitably annotated would enhance the value of the book to the student, enabling him to have a clearer histological picture of the various types of Leprosy.

The new bibliography gives a list of books, conference reports and papers and is invaluable in making the literature easily accessible to those interested.

PSYCHOLOGICAL MEDICINE. A SHORT INTRODUCTION TO PSYCHIATRY. Second Edition. By D. Curran and E. Guttman. Edinburgh : E. & S. Livingstone, Ltd. 1945. Pp. viii + 246. Price 10s. 6d. Postage 6d.

This is a very useful book for practitioners and students, who will find that its broad approach and lucid style make it easy to read and digest.

The first chapter gives an admirable exposition of the principles which should underlie the attitude of the doctor towards the patient. It is therefore a little disappointing that this is not followed up in more detail under the heading of the various syndromes described. A fuller account of psychosomatic disorders would also be welcomed by the practitioner and could be given without disturbing the balance of the book, on which the authors deserve considerable credit.

The appendix on war psychiatry will, of course, attract interest from readers of this journal, but its material, seen as it is mostly from a naval angle, will be not entirely relevant to their own problems in detail.

Nevertheless, these are small points in a book whose clarity and stimulating expression will encourage clear thinking and sound treatment.

PENICILLIN—ITS PRACTICAL APPLICATION. General Editor: Professor Sir Alexander Fleming, M.B., B.S., F.R.C.P., F.R.C.S., F.R.S. London: Butterworth (Publishers), Ltd. 1946. Price 30s.

To review this work adequately would require more space than we have at our disposal. Suffice it to say that it is a comprehensive review of Penicillin by a group of contributors under the general Editorship of Sir Alexander Fleming. It deals with the History, Development, Pharmacology and the Therapeutic role of Penicillin in all its applications in the light of present knowledge.

As Sir Alexander Fleming points out in his Preface, there is, inevitably, some over-lapping as well as some minor differences of opinion. These do not, in any way, detract from the value of the book.

All fields of possible application for penicillin therapy appear to be covered; even obstetrics. The book is full of practical advice written by contributors with adequate experience of its potentialities in their specialized fields of medicine and surgery.

There emerge some definite warnings. Penicillin is not a panacea and this note of warning is sounded repeatedly. Its selective action is emphasized and it is made quite clear that the clinician must work in the closest collaboration with the pathologist so that the causal organisms may be quickly identified in any given condition. As is said, penicillin does no harm and there is no such thing as over-dosage but there is no point in trying to treat a non-sensitive infection. The surgical writers all stress the necessity for orthodox surgical procedures. Penicillin is not a surrogate for surgery but a hand-maiden. This is rightly emphasized.

The advice given as to the use of penicillin in general practice is clear, sound and practical. It is made quite clear that penicillin is not a "cure all" although it is a new and powerful weapon in the armamentarium of the general practitioner.

The book does less than justice to some of the more dramatic moments in the story of penicillin therapy. When first injected into the sub-arachnoid space for pneumococcal meningitis those who watched by the bed-side saw, as one said, "A veritable miracle happening before our very eyes—a dying man recover, even as we watched."

Although in some respects a patch-work quilt, this volume covers its subject thoroughly and authoritatively. The illustrations are good. It is a volume which should be in the hands (not on the bookshelf) of every medical practitioner.

The two clinical sections. "Prophylactic use of Penicillin" and "Wounds and Gas Gangrene" by A. E. Porritt and G. A. G. Mitchell, are of particular interest to Service surgeons.

LISTER INSTITUTE OF PREVENTIVE MEDICINE. Collected papers, Nos. 39-40.

The Editor acknowledges the receipt of these which have been placed in the Library of the Royal Army Medical College.

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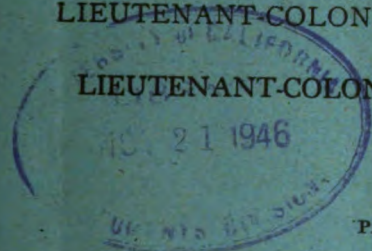
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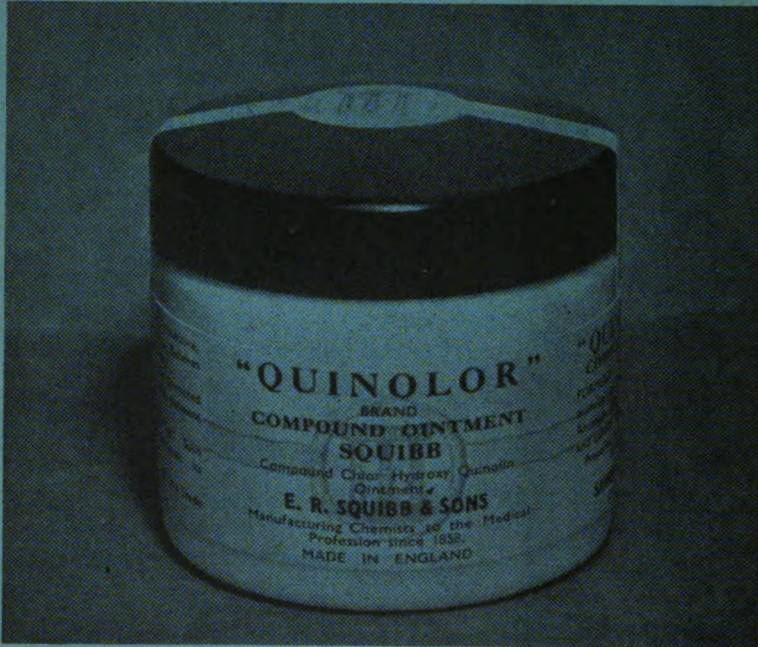
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Journal of the Royal Army Medical Corps.

Original Communications.

THE TREATMENT OF EARLY SYPHILIS IN THE ARMY.

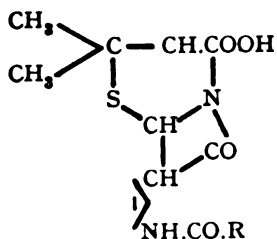
BY

Lieutenant-Colonel R. R. WILLCOX,



*Royal Army Medical Corps.**Adviser in Venereology.*

[Received July 29, 1946.]

[*Chemistry of Penicillin.*— . . . Of various formulæ discussed from time to time the most likely one seems to be that known as the lactam formula, which is as follows :



The different penicillins so far examined seem to have the same general structure and to vary only in the nature of the side chain R. There is a difference in the nomenclature of the substances in Great Britain and the United States of America, as follows :

R	British name	American name
— CH ₂ CH = CHCH ₂ CH ₃	Penicillin I	Penicillin F
+ CH ₂ 	Penicillin II	Penicillin G
— CH ₂  OH	Penicillin III	Penicillin X
+ CH ₂ CH ₂ CH ₂ CH ₂ CH ₂ CH ₃	Penicillin K	Penicillin K

Penicillin I, with a penicillan side chain, is the one produced by the original surface culture fermentation strains in England, whereas penicillin II is the one produced in the largest amount by more recent surface culture strains and by the submerged culture

strain used in the United States of America. Penicillin K is a later addition to the series and is produced by a recently isolated strain of *P. notatum*. From "Penicillin—Its practical application." General Editor: Professor Sir Alexander Fleming. (1946, pages 27 and 28)—Ed.]

THE discovery of penicillin has wrought great and sudden changes in the treatment of syphilis, but, as in previous such revolutions in the treatment of this disease, its end effects cannot be foreseen at this stage. In consequence, the treatment of syphilis is in a state of flux and doubtless will remain so for a few years to come. It is thought, therefore, that non-venereologist medical officers might be interested in a review of the situation affecting the British Army as it stands in July, 1946.

At the beginning of the war the standard treatment for all early syphilis in the Army was organized on a schedule consisting of four courses of arsenic and bismuth. Each course consisted of 5.85 grammes of neo-arsphenamine and 2.0 grammes of bismuth. A rest period of four weeks was given between courses and at the conclusion there was a surveillance period of two years, during which time the patient received repeated blood tests and a cerebrospinal fluid examination.

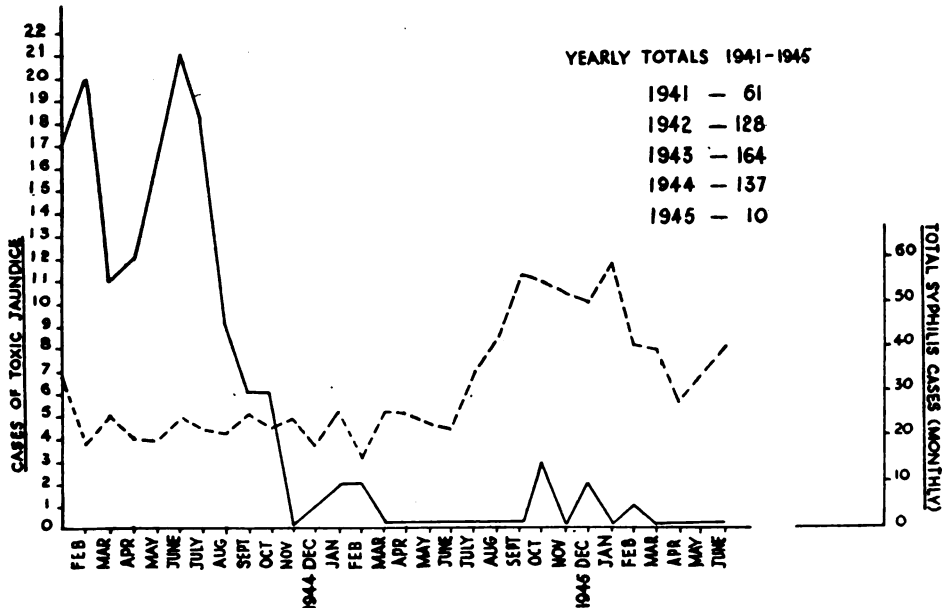
The main disadvantages of this mode of treatment were the length of time involved with the repeated attendances at hospital and the complications, such as jaundice and arsenical dermatitis. However, under Brigadier Osmond's wise leadership, the difficulties of administration were overcome and, considering the successive events of threatened invasion at home, continual air attacks and sending of vast armies overseas, when one examines the old I. 1247 cards, one is amazed at the very high proportion who satisfactorily finished their treatment.

As regards the complications, the incidence of jaundice was the most perplexing one. This complication had a peacetime incidence of less than 5 per cent and this remained so until the spring of 1941, when it rose steadily, and by 1943 over 50 per cent of cases treated in some clinics suffered from this complication [1]. The jaundice was often severe and necessitated the patient being immobilized in hospital for some weeks, and it was at first thought that this was due to the effect of the arsenic on the liver. Later attempts to reduce the incidence of the disease by the prophylactic oral administration of sulphur containing amino-acids proved unsuccessful [2].

Following the suggestions made by Dr. MacCullum [3] and Lieutenant-Colonel Bigger [4] the possibility that the jaundice might be caused by an infective virus passed from patient to patient during the administration of the injections was then explored. Up to this time it had been common practice in military and most civilian clinics to sterilize the syringes by boiling at the beginning of a session but only to use methylated spirit or other disinfectants between injections for sterilization purposes. This theory was confirmed by Lieutenant-Colonel King *et al.* [5] working at Netley, and later by Major Laird at Preston [6] who, by adopting an operating theatre kind of technique in the giving of injections, were able to banish jaundice from their clinics.

. Sterilization of syringes by boiling between injections was soon made general for all hospitals. This has controlled the disease but has not altogether stamped it out, for occasional cases still occur, and, if the precaution of boiling were relaxed, doubtless the disease would break out anew. The introduction of boiling of syringes nearly coincided with the use of penicillin, so that there was a double change of technique, but, even allowing for this, the following graph is of interest, as it shows the striking change in the numbers of jaundice cases admitted to the Military Isolation Hospital, Harrow Road, from 1944-1945. It will be seen that the vast numbers of jaundice admissions drop almost to zero, while the number of syphilis admissions per month has actually increased over the same time. This is of added interest, as, after June, 1945, arsenic injections were renewed—this time in conjunction with penicillin. The odd case of jaundice, however, still does occur.

RISE AND FALL IN MONTHLY TOTALS OF CASES OF TOXIC JAUNDICE FOR YEARS 1944-1945.



As the war progressed, as a result of work in the U.S.A. [7] it became evident that syphilis could be cured by a quicker if more dangerous means by an intensive form of arsenical treatment employing an arsenoxide ("Mapharsen") which was, and still is, much in vogue in the U.S.A. The dose of this drug is one-tenth of the corresponding dose of neoarsphenamine. This intensive treatment involved the giving of 1,200 mgm. of "Mapharsen" five or eight days by means of an intravenous drip. One-day treatments of arsenic combined with fever were also employed, but did not prove successful. As with other new treatments, this was found to have its complications attendant on the treatment given quite apart from the therapeutic results obtained. In

this case the main worry was that of arsenical encephalopathy. This complication, manifest by headache, pyrexia, drowsiness and sometimes coma and death, was only seen very rarely under the older long term regimes, though it had a much higher incidence in Indian troops.

Arsenical encephalopathy was rendered much less alarming by the arrival of B.A.L. This preparation (British Anti-Lewisite), which was developed in connexion with chemical warfare as an antidote against organic arsenicals, has the property of being able to remove the arsenic from combination with the cells and enables it to be excreted as a relatively non-toxic substance. It has been found to be of value *if given early* in encephalopathy, dermatitis, and agranulocytosis when due to organic arsenical substances.

The possibility of this grave complication was one of the reasons why this treatment was not pursued in the Army as a general measure, though several preliminary trials were made in different centres with a modified intensive schedule on a twenty-day basis giving 1,200 mgm. of "Mapharsen" in twenty daily injections with the addition of bismuth.

The continuance of these schedules of intensive arsenical treatment instituted solely for the purpose of shortening the treatment was rendered unnecessary with the introduction of penicillin. This was first given for syphilis by Mahoney *et al.* in 1943 [8] who, as a result of animal experiments, chose a dose of 1.2 million units and had success in four cases. So inspired was the calculation of the dose thought to be that most of the early schedules used in America employed this dose over varying periods of time. When the drug came to be applied to the Services, the dose was doubled and 2.4 million units given in three-hourly night and day injections of 40,000 units each (for seven and a half days). This was later copied by the British.

The immediate results were remarkable for at last there was an intensive form of treatment without any serious risks and the intensive and the long term arsenic schedules were discontinued and all syphilis in the Army was treated on this regime. Early in 1945 the Central Syphilis Register was opened and so there was a method of checking the relative efficiency of different treatments. Soon after this the European war terminated and demobilization began, and, as syphilis has to be followed for at least two years for convincing results and for life for conclusive ones, it was realized that even the Register could not give the ultimate information, though it might provide some very interesting interim data, and indeed was, perhaps, the only machine in the country which could do so.

As the months progressed, it became evident that all was not well, for a comparative rarity of the earlier treatments—the mucocutaneous relapse—was making itself felt in the clinical field. Sores were relapsing and condylomatous or moist papular lesions were reappearing in the genital area containing motile *Spirocheta pallida* and associated usually with a relapse in the serological titre of the blood. The relapses, therefore, were of an infectious type and their apparent increasing frequency gave much food for thought.

An analysis was made at the Central Syphilis Register and some 270 cards were selected where the patients had been followed for six months or more on

both the 2·4 million units of penicillin schedule and the twenty-day intensive arsenic and bismuth scheme. Disappointment has been expressed in some quarters that this series was not larger, but it has to be remembered that the Register had only been in full operation for some months (and six of these were required for the follow-up) and, added to this also, demobilization had commenced. The percentage of failures was found later to coincide with the American figures, not available at this time, and showed a failure rate at six months of 8 per cent on the penicillin schedule and 2 per cent on the twenty-day regime [9].

As a result of this, it was decided that 2·4 million units alone was not enough for the treatment of early syphilis. Eagle had shown experimentally [10] that penicillin and arsenic had a synergistic action in the treatment of rabbit syphilis, and Lieutenant-Colonel Marshall conferred with Dr. Selbie to see what doses of arsenic could reasonably be combined with penicillin in the treatment of the disease in man. A general experiment in Home Commands was then started. The Military Hospitals at Netley, Knaphill, Catterick, and Harrow Road employed a regime consisting of 2·4 million units of penicillin combined with ten daily injections of 0·06 gramme "Mapharsen." The remainder, with the exception of the Military Hospital at Chester, used penicillin only, but the dose was increased to 4 million units. Chester continued with a schedule, which was in use at Preston prior to the commencement of the experiment, consisting of 2·4 million units of penicillin plus 400 mgm of "Mapharsen," plus 2·0 grammes of bismuth. To date, some 1,000 cases have been treated by the combined penicillin and arsenic schedule, some 600 with penicillin only and about 800 with the combination of three drugs at Preston and Chester. Complications with the combined arsenical and penicillin regime have been relatively small though there have been two instances of encephalitis, both of which recovered and both of which received B.A.L. It was intended to treat 1,000 cases by these regimes before assessing results. It is obvious that to obtain a failure-rate figure for six months will require a few more months yet.

Owing to demobilization, it is impossible to say how this experiment is going. Apparently from reports received the schedule of four million units only has produced the least number of known failures, but, as this regime is used in the smaller clinics, the individual experience of relapses would be smaller. At the Military Isolation Hospital, Harrow Road, some 550-600 cases have been treated and I personally have seen 9 relapses occurring in periods up to eight months. As only about one-fifth have attended the hospital after six months, it is impossible to state whether this is good or bad, though it does not appear very encouraging. Nearly as many failures, too, have been found in the Chester series.

In February of this year the United States held a large meeting in Washington under the auspices of the United States Public Health Service and the National Research Council. I was privileged to attend as an observer. Here the combined work of some 43 clinics who had participated in a research study of the effects of penicillin in syphilis was presented. The data offered at this

meeting [11] showed that the relapse rate on the 2·4 million unit schedule was 15 per cent in eleven months, though it was shown that the addition of arsenic and bismuth to a penicillin schedule lessened the liability to relapse. Non-penicillin schedules produced better results in the same period : the five and the eight days intravenous drip showing an 8 per cent relapse and the more prolonged Eagle twelve weeks system where "Mapharsen" was given three times a week and bismuth once a week over twelve weeks produced a relapse rate of only 3·5 per cent.

Meanwhile venereologists in Britain while having none of the vast American organization to guide them were forming similar conclusions for themselves and civilian clinics generally were combining penicillin with both arsenic and bismuth. The field was still further complicated by the arrival of penicillin in oil-wax preparations which cause a delay in the absorption and excretion of the drug so that the daily dose may be given in one instead of repeated injections. This tended to cause the penicillin doses to be increased somewhat for reasons of safety.

As a result of all this, it was decided that the Army at home should continue the experiment that has been started until the analysed data could be obtained. All these schedules it will be remembered contain treatment well above the bare 2·4 million units of penicillin. Overseas Commands on the other hand have been recommended 2·4 million units of penicillin plus one course of neoarsphenamine old style. This it will be observed is a departure from the intensive principle of recent years and is the first step on the road back to pre-war treatment : whether this is to be the only step or the first of several remains to be seen.

Recently has come to light a matter which alarming in its immediate prospects may ultimately prove a timely revelation that may once again restore penicillin to its position of two years ago. It has been reported from America [12] that within a week of the Washington meeting some disturbing information had been obtained. This was that two laboratories working on the effects of penicillin K on rabbit syphilis had found that this fraction was notably less effective than penicillin G. Following this, one centre reported a paradoxical result in so far as a schedule of 1·2 million units over three and three-quarter days was found to be more effective than one at a later date with double the dose over double the time. As it was known that commercial penicillins of recent years have contained an ever-increasing amount of penicillin K, this prompted a further large-scale analysis of results in respect of the time factor. It was then evident that cases treated before May, 1944, did markedly better than those treated after that date. It was concluded that certain commercial penicillins processed in recent months are less efficacious in the treatment of syphilis than were the preparations available two years ago. It is probable that some of the decreased therapeutic effect is due to the increased amount of penicillin K which has been present in the commercial preparations of many manufacturers. The existence of other factors such as the removal of possible therapeutically active impurities must also be considered.

The response to this sudden and unexpected bombshell has been very rapid. Steps were at once taken in America by all manufacturers to reduce the K content of commercial penicillin and practically all the commercial penicillins available now consist predominantly of G. One manufacturer indeed has already placed on the market a crystalline product of G containing at least 95 per cent of G, and new research schedules in the U.S.A. are employing crystalline penicillin G in schedules of 2.4 and 4.8 million units over seven and a half days as from July, 1946 [13].

And so the difficulties seem to have been overcome almost as soon as they arose, and the research continues with increased vigour.

Meanwhile, in this country at the time of writing, venereologists are so divided in their opinions as to the correct method how penicillin should be administered that it is to the co-operative figures of the United States and, it is hoped, to the figures provided by the Central Syphilis Register that they must turn. Later, perhaps, venereologists in civilian life may be joined in groups either voluntarily, for there is nothing to stop them doing that now, or compulsorily, so that schedules can be tried and analysed on a scale comparable with American methods.

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A SERIES OF B.L.A. EYE CASUALTIES,

BY

Major R. A. D. CRAWFORD,

Royal Army Medical Corps.

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THIS is an analysis of 866 eye cases evacuated by air from B.L.A. and sent immediately to an eye unit on arrival in England. They were then investigated, treated and evacuated to base hospitals as soon as fit.

The unit was situated in a small hospital at Stratton St. Margaret, near Swindon; the patients occupied one of the several standard huts erected in the grounds and usually overflowed into others. Casualties arrived nightly between 17.00 and 24.00 hours by ambulance from nearby airfields and were unloaded by personnel from a field ambulance attached to the hospital. They were sorted in a large reception hall by the surgeon on duty and by the dental and ophthalmic surgeons as indicated. Cases requiring resuscitation or surgery went to one of the wards in the main hospital, others to the huttred wards.

The medical and nursing staff was entirely civilian. The eye ward was in the charge of an experienced sister, with a staff of V.A.D.s and Nursing Auxiliaries. Although quite untrained in ophthalmic nursing, these auxiliaries were very quick to absorb instruction and most conscientious over their work. The fact that there was in this series no accident due to inadequate nursing skill reflects the highest possible credit upon them.

In many cases the medical histories were incomplete, and in very few was any follow-up possible. Cases with intra-ocular foreign bodies had to be sent to hospitals with giant electro-magnets, and were lost sight of. Thirty-seven Canadian patients were at once transferred to Canadian hospitals.

However, it is possible to analyse the different types of case and present some idea of the rate of eyes lost and blindness caused. The series is unselected; if planes were available patients came by air and, if not, by sea. Thus, many minor casualties were seen as well as severe ones. Casualty evacuation by air was always secondary to air supply.

Many were received from the Continent on the same day as they had been wounded, most during the first few days, while others had spent a long time in hospital before being evacuated.

	Total	No. of Cases	Eyes Removed	Cases sent to St. Dunstons
<i>Orbital Foreign Body</i>	72			
With definite perforation of the globe ..		7	6	
With vitreous hæmorrhage		49	2	
With commotio retinæ		12		
Associated with loss of the other eye ..		2	(2)	2
Associated with corneal damage to other eye		2		

	Total	No. of Cases	Eyes removed	Cases sent to St. Dunstons
<i>Burns</i>	25			
Of the eyelids		20		
Of the cornea		4		
Of the cornea, bilateral		1		
<i>Corneal Foreign Bodies</i>	147			
One eye only		79		
Both eyes		51		6
Associated with loss of the other eye..		15	(15)	6
Associated with commotio retinae other eye		1		
Associated with vitreous hæmorrhage other eye		1		
<i>Perforating Corneal and Corneo-Scleral Wound</i>	95			
One eye only		66	20	
Associated with loss of other eye ..		13	(13)	13
Associated with corneal abrasion other eye		3		1
Wounds of both eyes, neither eye lost..		13		11
<i>Intraocular Foreign Bodies</i>	126			
Result unknown		42		
F.B. extracted anteriorly		24	6	
F.B. extracted posteriorly		38	7	
F.B. not removed and eye lost ..		6	6	1
I.O.F.B. associated with loss of other eye		4	(4)	3
I.O.F.B. associated with corneal damage other eye		6		
I.O.F.B. known extracted in U.K. ..		6	2	
<i>Perforated Scleral Wounds. No F.B. Found</i>	33			
One eye only damaged.. .. .		25	9	
Associated with loss of other eye ..		3	(3)	3
Associated with corneal damage to other eye		2		
Associated with commotio retinae to other eye		1		
Associated with cataract in other eye..		1		1
Associated with vitreous hæmorrhage..		1		1
<i>Concussion Cataract</i>	2	2		
<i>Commotio Retinae</i>	30			
One eye only		22		
Associated with loss of other eye ..		3	(3)	3
Associated with cataract in other eye..		1		1
Associated with vitreous hæmorrhage other eye		1		
Macular hole without detachment ..		3		

magnetic, and most of these eyes must be presumed to have undergone serious deterioration later. The conditions seen were very different from that of the tiny sterile steel splinter of civil work.

Excisions.—The strong tendency shown by general surgeons and G.D.M.O.s to label wounded eyes as “disorganised” emphasizes the importance of forbidding the removal of eyes before an ophthalmic surgeon has seen the case. I am told this was also found a necessary rule in other theatres of war. The bogey of sympathetic ophthalmia would otherwise be responsible for many unnecessary excisions in recently wounded men. It is not generally realised that this condition virtually does not occur during the first two weeks.

A plastic globe should be inserted in Tenon's Capsule in practically all excisions. The recti are firmly sutured in front of it, and the conjunctiva closed in a separate layer. Unless this is done the globe may not remain buried: it was extruded in one case evacuated from B.L.A. There is moderate post-operative pain only, and this does not continue beyond the second day. The cosmetic effect is superb, with a freely mobile artificial eye. No failures occurred in cases so treated at Swindon.

Orbital Foreign Bodies even without evidence of perforation of the globe often caused severe damage to vision, especially by vitreous hæmorrhage. Removal of the foreign body will seldom benefit the eye, and was only undertaken in a few cases with very large fragments.

Burns of the eyelids had been treated with vaseline gauze, and by the time patients arrived the lids were fixed by dried exudate, reinforced by the gauze, and could, in several cases, not cover the cornea. Vaseline must be applied freely, without gauze, and saline packs require to be damped frequently.

St. Dunstons.—Of the patients sent to St. Dunstons, several would undoubtedly recover some vision, especially by the removal of cataracts; so this figure is probably too high to be taken as the number blinded in the series.

However, later complications are likely to account for a degree of blindness amongst some of the other cases, and so tend to correct this error.

CONCLUSIONS.

Although no actual figures can be given owing to the sketchy nature of field notes, the incidence of gross sepsis in penetrating eye wounds was very much less than had been expected from experience of civil accidents. For this credit must be given to the early use of sulphonamides and penicillin.

No correlation can be made between the severity of the wound and the time elapsing before the man's arrival in the U.K. The line of evacuation depended on the relative availability of transport to a local hospital and to the U.K. Air evacuation enabled many casualties to be brought to specialist attention in England within a few hours, saving much delay and misery. Patients generally arrived in good condition, and many remarked that the worst part of the journey had been the ambulance ride to the airfield. Their joy at being in England played a considerable part in the recovery of the severely wounded.

SUMMARY.

866 eye casualties air-evacuated to the U.K. over the period August, 1944-May, 1945, are analysed.

297 eyes were removed from 293 men.

59 men were sent to St. Dunstons.

Of the total, 753 were battle casualties, 93 medical and other conditions, and 20 due to accidental injuries.

MALNUTRITION AND CHRONIC SEPSIS.¹

BY

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GENERAL RANKEN—LADIES AND GENTLEMEN,

I feel rather like Daniel in the Den of Lions—one Pathologist facing a score or more of surgeons. However, I feel so strongly on the subject of my talk to-day, that come what may, the lions must be bearded. What I have to say must seem somewhat undocumented, but in these days of difficulties in obtaining literature, I hope you will excuse me. Further, it is impossible to acknowledge all sources of information as these are culled from short abstracts made from papers, official circulars and so on, before they have to be passed on to other units.

The interest of myself and of my laboratory colleagues arose when we got tired of writing the cause of death in autopsies performed on cases dying of Chronic Sepsis, as the "Toxæmia of Chronic Sepsis," which is, by itself, a fairly meaningless phrase, unless the many underlying factors are analysed. An analysis was therefore carried out with the assistance of the Officer Commanding 128 I.B.G.H. and the Officer in Charge Surgical Division, to whom our grateful thanks are due.

Following our analysis, both ante-mortem and post-mortem, on these cases, of necessity not in any way exhaustive, we began to wonder if some of these cases were not dying unnecessarily. It is this aspect I wish to stress to-day. On the diagram (p. 69) are set out some of the many interrelated factors involved, the sum total being a failure of the delicate cellular mechanism of the body, which is all important in sustaining life.

You are no doubt more interested in the clinical side of this question rather than in the elaborate biochemical processes involved and, for this reason, I ask you to accompany me in imagination to the bedside of a fairly typical case.

This, then, is the patient, a man aged 25 who has sustained a severe compound fracture, grossly infected, of the shaft of the right femur, from a gunshot wound at the Eastern front some two months ago. He has reached this hospital by a roundabout route and has had adequate surgical treatment by modern surgical tenets, that is to say, adequate drainage, immobilization and the administration of effective bacteriostatics, such as penicillin and sulphonamides, given correctly and in adequate doses for a sufficiently long time but, as you stand by the bed, you feel a sense of frustration and hopelessness at the lack of response.

However, let us analyse the case in detail. We see an emaciated, flushed

¹A lecture delivered at a conference of Southern Army Surgeons at a Base Area in India on September 11, 1944.

and febrile patient with a dry tongue and sunken eyes, with a low inter-ocular tension, and we become aware that dehydration ((I) on diagram) is rearing its ugly and dangerous head. Knowing that the adult male consists of at least 60 per cent water, we ask if the fluid intake is adequate. However, we find that the patient is taking only about two and a half pints of fluid in the twenty-four hours. We incidently note the far too frequent belief that the contents of a glass tumbler is equal to about one pint when in fact it is usually less than one-half. We point out the great importance of water, the fact that over half the weight of the body consists of water ; that it is the universal solvent, and lubricant ; that it plays a vital part in many chemico-physical reactions, and of course carries food and removes waste products from the remotest cells, as well as being intimately concerned with temperature control.

A young adult of say about 70 kg. in weight, in perfect health doing light work in a temperate climate, requires roughly 2,800 c.c. per day, less than half of which is obtainable in food. How much more, therefore, will be required for a febrile patient in a tropical climate ?

A case in point arose the other day—a blood volume was done on a patient, because on arrival from an ambulance train at night the Medical Officer admitting the case stated that the patient appeared dehydrated. Six hours later at 9 a.m. when the patient was seen by me, the signs of dehydration were not very obvious. However, a blood volume was carried out and gave a surprisingly low result, and although not much attention was paid to it in view of the fair condition of the patient, he was put on high fluid intake and a measured urine output. During the first twenty-four hours he passed only a few c.c. of urine and it was only on the third day that his output reached 18 ounces. The dehydration was therefore masked and the importance of this hidden dehydration is emphasized when it is realized that the blood count which on the first day was 3,500,000 red blood cells per c.mm. had fallen without additional hæmorrhage to just over 2,000,000 red blood cells per c.mm. on the third day. Therefore, what seemed to be a reasonable operative risk, was in fact a very bad one, although in this case sepsis may have aided in the red cell reduction. Of course it is not only the red blood cells that are concentrated, but also other blood constituents such as plasma, proteins, etc. Plasma volume falls and with it the blood-pressure and results in impaired capillary circulation, anoxial endothelial damage and in loss of tissue constituents from the cells.

Salt metabolism is closely associated with that of water, and salt deficiency, as well as being responsible for the well-known muscle cramps, has far-reaching effects on the physiology of the animal.

When it is realized that the sodium in the sodium chloride supplies 90 per cent of the metallic ions in tissue fluid, and the chloride 70 per cent of the acid electrolyte, its importance will be obvious and, further, there is practically no mobilizable store of sodium apart from that in the body fluids. There is therefore a disturbance of the acid-base balance with a resulting anorexia, which is of considerable importance in an already wasted patient. The

mechanism of osmotic control of the tissue fluids already profoundly disorganized by dehydration is further harassed, and tissue metabolism may give up the unequal struggle.

The next obvious facts about our patient are that he is both febrile and wasted ((II) and (III) on diagram) and although these two symptoms are linked, let us first deal with the nutritional requirements of the febrile case. This patient is certainly not in a basal metabolic state, although he is in bed ; he is restless and constantly moving as far as the plaster will allow him. He washes, shaves and has to feed himself, all of which actions call for a surprisingly large calorie output, also trauma itself seems to exert a specific catabolic effect. So let us say that this man will require some 2,000 calories in twenty-four hours if he were afebrile. Actually his temperature is 103° F. and it is a well-known physiological fact that for each degree rise of temperature Fahrenheit the metabolic requirements are increased by 7 per cent. That is to say, in this man by 35 per cent, which is 700 calories in twenty-four hours. Further, it has been shown by Shaffer and Coleman that, if body wasting is to be prevented in a febrile case, the calculated calorie requirements must be exceeded by 50 to 100 per cent, and the diet must contain a large amount of proteins of high biological value. In fact this patient then requires about 3,500 calories in the twenty-four hours. Having realized what a large calorie intake is needed, let us go into detail. We find that, as the case is febrile, he has been placed on a "fever diet," consisting chiefly of milk and soda and, in fact, he is rapidly being starved to death. An average glassful of undiluted milk producing about 150 calories only.

I fear that the old teaching of light diets for fever cases dies hard ; the Sister will, no doubt, point out that the patient will not eat. You may say this is so, and that the anorexia that accompanies fever cannot be so easily overcome. Then let me take you to a hospital in this area where a great deal of interest is taken in diet ; there you will see patients who are febrile literally eating their way to health, taking 3,500 calories in the day, and asking for more. In fact chicken does not interest them, and they demand lightly cooked liver, etc. This desirable state of affairs was not achieved without a great deal of painstaking persuasion by all concerned. Firstly the Quartermaster had to be approached and a new "light" diet drawn up with his help. Then the nursing staff had to have their old-fashioned prejudices overcome and, finally, the patients had to be persuaded to eat. This was difficult at first but good nurses can achieve miracles if they are themselves converted.

I wonder just how many of you gentlemen can tell me how many calories your cases are actually taking in twenty-four hours. I feel it would be fair comment to say that this side of treatment is equally important with the best of surgical technique and it is far too often left to the nursing staff to carry out.

When, as I hope to point out later in this lecture, it is realized that it is not only calories, but protein, vitamins and other essential constituents that are not forthcoming in this man's diet, you will recall the old truism that "a good surgeon is a physician who sometimes uses a knife."

Wasting, which should be avoided especially in orthopaedic cases when

good muscle is essential to efficient recovery, will occur as long as the body is not in a state of nitrogen balance; that is to say just so long as the protein intake is insufficient to supply the body's needs, so will the protein tissues continue to be catabolized. There are sometimes difficulties in making a sick man take a high protein diet, but carbohydrate will act as a "protein sparer." However, in such a case at least 100 grammes of good proteins should be taken daily.

You may say that the patient will not digest and absorb this large amount of food, but we have practical evidence to show that the food is being absorbed. If, however, a sprue syndrome is present, possibly even induced by the starvation diet usually employed in such cases, the situation is admittedly more complicated, but a high protein, high vitamin, low fat diet will usually do the trick, and if necessary pre-digested protein can be administered as amino-acids by oral or parental routes. This will be discussed when we deal with liver failure.

The next important point that comes out of our study of this patient is that the laboratory reports that the plasma proteins are low and in fact may be at or below the oedema level ((IV) on diagram). This is due to a combination of factors: low protein intake, loss from hæmorrhage, and loss from wounds in the sero-sanguineous discharge, liver damage, and possibly to plasmaphoresis through damaged capillary endothelium, the latter due to dehydration, local anoxia, etc.

You may ask what is the great importance of all this. Hypo-proteinæmia has been the subject of intensive work for some years, and the more obvious changes resulting are of course oedema inanition, failure of growth, anæmia and (to quote H. C. Hopps and J. Campbell, 1943) protein deficiency affects both qualitatively and quantitatively the regeneration of tissues. It predisposes the liver to injury by toxins and seriously interferes with antibody synthesis, and is an important cause of delayed wound healing and wound dehiscence. Further, experimental evidence has been brought to show that a low plasma protein greatly increases the risk of damage to the liver by toxic drugs such as chloroform and N.A.B.

The quantity of protein-containing serum that soaks into plasters is well known to you all, and so I expect are the difficulties that arise when massive oedema occurs under a plaster or at the stoma of a gastro-enterostomy.

The answer is of course that no military patients should ever be allowed to develop a low plasma protein, and if they do, a high protein diet, parental or oral amino-acids, with intravenous administration of plasma, are a vital necessity.

The next points to be considered are the liver changes ((V) on diagram) that take place in the type of case now under discussion.

The organ may be palpable during life but at post-mortem it stands out in the emaciated cadaver in a most dramatic manner. It is uniformly enlarged and on section cuts greasily and may actually show the waxy appearance of amyloid disease. But generally the organ is intensely fatty and microscopy shows large globules of fat pushing the nuclei of the liver cells to one side

giving the characteristic signet ring appearance of fatty degeneration. This condition, to quote Boyd's "Pathology of Internal Diseases," "is induced by starvation, thus explaining in part the frequency with which it is found in hospital patients."

It has been shown that the sulphur-containing amino-acid methionine is of the greatest importance in the defence of the liver against toxic agents and that, by the mysterious process of transmethylation, methionine transfers its methyl group to enthanolamine with the formation of choline (Stretten). Choline is known to be a strong lipotropic factor and greatly concerned with mobilization of fat in the liver. These essential elements are of course not readily available in a starvation diet although the fat that accumulates in the damaged liver cells is fat from outside that organ, i.e. alimentary or fat depot fat, and not, as was once thought, the actual product of the degenerating cells; the vital functions of the organ must be seriously impaired if the fat is present in vast amounts as indeed it is in the type of case under discussion.

To appreciate the importance of the above remarks your attention is drawn to the enormous lists of liver functions to be found in any modern physiology book; for example Best and Taylor give a list as follows: "Besides the secretory and excretory functions . . . the liver plays an important role in many other physiological processes . . . given below.

- (a) Blood formation in the embryo; hematinic principle in the adults.
- (b) Fibrinogen production.
- (c) Prothrombin production.
- (d) Heparin production.
- (e) Iron and copper storage.
- (f) Blood volume regulation.
- (g) Reticulo-endothelial activity.
- (h) Detoxication.
- (i) Protein metabolism, deamination, amino-acid synthesis, urea and uric acid, hippuric acid synthesis.
- (j) Carbohydrate metabolism.
- (k) Fat metabolism.
- (l) Heat production.
- (m) Formation of vitamin A from carotene."

Besides the above may be added an important part of the antibody synthesis and possibly plasma protein control.

It should now be readily appreciated how desirable it is to prevent gross changes in the liver and realized that correct feeding will play a very great part in this prevention.

Therapy is not in my province but I would take this opportunity of drawing your attention to the large amount of work carried out in recent years by workers such as Ravdin on the feeding by parental or oral route of the essential amino-acids. The most useful is a casein hydrolysate as it is rich in methionine; however, we have used an acid pork digest with good effect and no reactions.

There is no reason why an ordinary military laboratory or indeed hospital kitchen should not be able to make a papain or peptic-tryptic digest for oral administration or feeding by duodenal tube. It has also been shown by

Ravdin that a loop of bowel will readily absorb such a digest and that high rectal feeding with digests of this nature has its uses.

Experiments have shown that in animals with experimental amyloid disease the feeding of raw liver will effect an absorption of amyloid. Raw liver being a rich source of protein of high biological value and containing many known and unknown factors will obviously be of the greatest importance in the treatment of cases of this nature especially if combined with the administration of vitamins now to be discussed ((VI) on diagram).

Continuing the clinical examination of our patient we refer back to the tongue and note that as well as being dry it may show the red raw beef appearance of a nicotinic acid deficiency or may be the magenta colour of riboflavine lack. Sordes and cracks may be noticed at the lip margins and angles and our ophthalmologist friends may point out an increasing limbal leash. The skin we notice is dry and harsh and pigmentation is present on the extensor surfaces, possibly the dermatitis of an early pellagra is seen and taken in conjunction with the mental changes previously called toxic delirium and the diarrhoea indicate a serious deficiency state. Bad wound healing with poor production of fibrous tissue, gum changes and a prolonged decolorization time following the interdermal injection of 2-6 dichlorophenol indophenol (for what it is worth) and a refractory anæmia point to a vitamin C lack.

Quick tests may indicate a vitamin K lack and in general it may be stated that this type of patient will be suffering from a multiple vitamin deficiency syndrome and it is pointed out that when clinical manifestations of vitamin deficiencies present themselves the deficiency is extreme.

This is not the place to go into such a complicated subject as tissue respiration but it should be realized that at least three water-soluble vitamins are known to be very important parts of tissue oxidative catalysts—and are essential to the co-enzyme systems of the body without the proper functioning of which life itself cannot exist.

The next observation we make on our patient is that there is a troublesome anæmia ((VII) on diagram) which may be either macrocytic, normocytic or microcytic, depending on various combinations of circumstances, and a low white cell count with a poor phagocytic capacity. The macrocytic type of anæmia is likely to be due to a combination of factors such as a poor absorption and intake of extrinsic factors coupled with liver damage and possibly chronic malaria associated with a toxic effect of the various circulating toxins on the bone-marrow. The normochromic normocytic anæmia may be due to recent blood loss or intravascular hæmolysis from circulating hæmolysins such as those produced by hæmolytic bacteria. Available iron and protein intake may be deficient or absorption poor and the actions of bacterial toxins on the marrow may even produce an aplastic type of anæmia. Vitamin and hormone deficiencies with parasites, such as those of malaria, hookworm and kala-azar, also play their part in generally depressing the hæmopoietic system.

The low white cell count is most troublesome and most feared by the

surgeon and unfortunately is little understood. This blood state has to be tackled from many angles both general and specific and a rational approach with a proper understanding of the physio-pathological principles underlying the condition is essential.

Your attention is now directed to a point ((VIII) on diagram) that may be overlooked—that is to say parasite infection of the body as an additional factor. Fever in septic cases is not always due to “pocketing of pus” and continual operative procedures naturally may interfere with local healing processes and may make general an infection in the process of being localized by natural defence mechanisms. The question of malaria and kala-azar should be constantly in the minds of surgeons working in those areas where these infections are likely to occur.

Hookworm may cause an iron deficiency anæmia resistant to treatment and amœbiasis may undermine months of hard work if not spotted and treated.

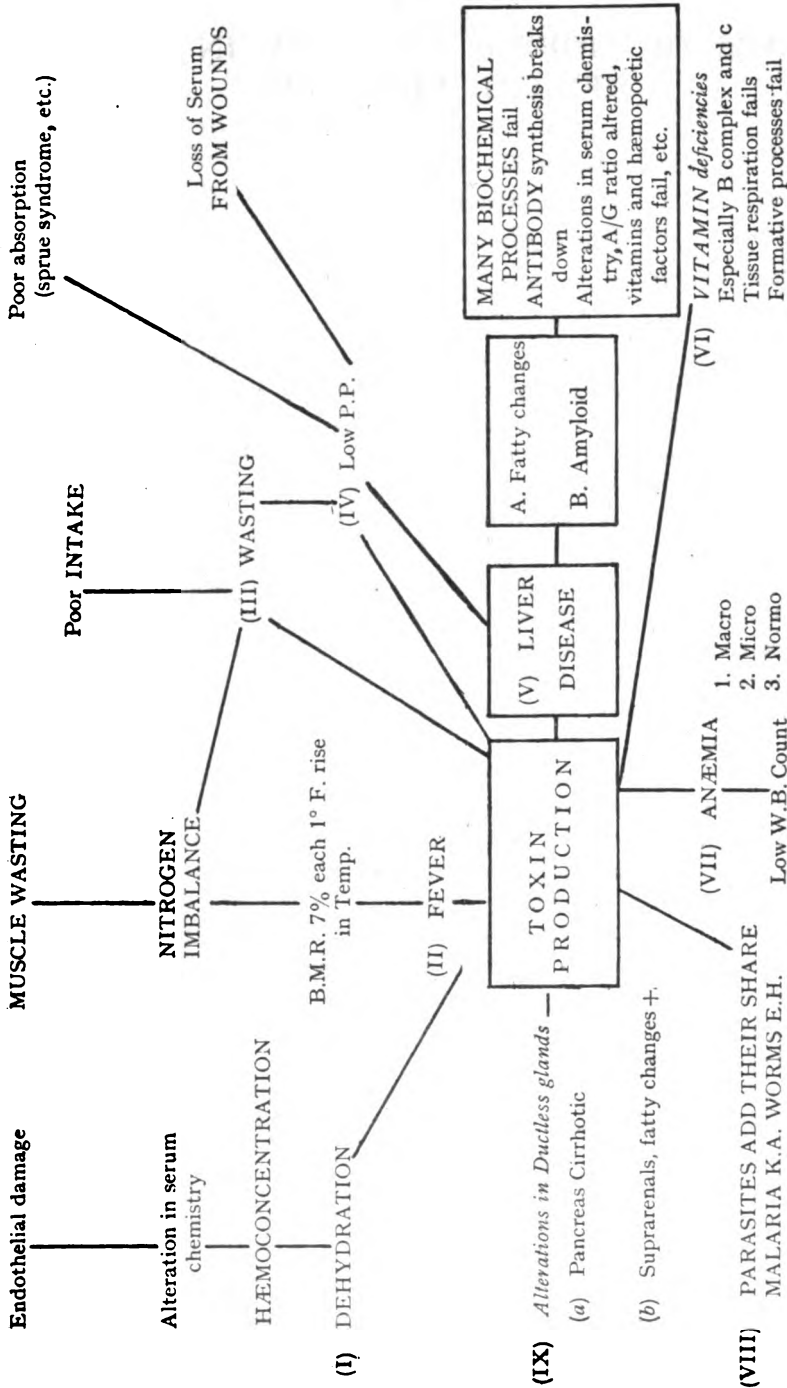
The next and last point on the diagram (IX) is “alteration in ductless glands” and it is regretted that this has not been gone into more deeply as it appears to be of some importance—the teaching that some cases of chronic sepsis have a lag type of glucose tolerance curve, was explained by the action of toxins on the liver and pancreas, but it did not strike one as important until at post-mortem on two of the cases of the type under discussion, I noticed the pancreas cut with a real creak and was extremely hard. Section showed quite an extensive cirrhosis of the organ. The pathology of the same possibly being damage by toxins and anoxæmia followed by fatty changes and subsequent attempt at repair by cirrhosis. We then examined the suprarenals which were found to show varying degrees of fatty degeneration. It is regretted that the other glands have not been examined in detail but it is hoped to do so in the future.

This, then, completes the rough general survey of our patient and points to some of the various combinations and permutations of side effects, all of enormous importance from the point of view of recovery, that must be taken into account in dealing with these cases.

It would be an impertinence for me to go into details of treatment of these various points but, to generalize, ensurance of good urinary output, good intake of well-balanced food, suitable replacement therapy with such specific treatment as may be indicated by a thorough summing up of an adequate clinical and laboratory examination, will go a long way to aid good surgical technique.

Please do not think this is an attack on our surgical colleagues; far from it. It is only due to their active co-operation that this survey was made and the point I stress is that the place for the pathologist is in the wards with his colleagues, the physicians and surgeons, and only by this co-operation at the bedside can we pathologists be truly your handmaids.

It is my belief that the future of Army pathology lies along these lines and, forsaking the bacteriological bench for the wards whenever possible, a cadre of clinical pathologists will be built up who, by their active bedside co-operation, especially in the tropics, may be of considerable value to their colleagues.



SOME OF THE MANY FACTORS INVOLVED IN MALNUTRITION IN CHRONIC SEPSIS.

THE SCOPE OF MORBID ANATOMY IN THE ARMY MEDICAL SERVICES.

BY

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(Based on five years' experience in India, Assam, and in B.L.A.)

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ON entering the Army as a pathologist one felt that Morbid Anatomy was regarded as the "Cinderella" of the Army Pathological Services. At the outset of the war, at least, the morbid anatomist felt there was no place for him and he encountered, or felt he encountered, a certain prejudice against the idea that he could adapt himself to the more generalized field of Army pathology. But five years in the Army Pathological Services convinced one that the morbid anatomist can adapt himself more readily to the general requirements of Army pathology than the bacteriologist or the so-called "clinical pathologist." In no department of pathology more than in morbid anatomy does so much depend on the personal experience of the pathologist. On active service, where one lacked the facilities of a University or scientific department, this truth was borne in upon one with great frequency during the past six years.

Coming, as it did, amongst the multitudinous tasks of daily laboratory work, autopsy work seemed scanty and sporadic in nature, but, reviewing the cases as I have done from the fairly complete records which I managed to keep, I have been struck with the wide range of the material and the real interest of so many of the problems presented. Though of a different character the field was no less interesting, and certainly not so narrow, as that encountered before and after in the Autopsy Service of a teaching hospital.

Post-mortem examinations were considerably fewer annually, of course, but the autopsies were done with a specific purpose or problem in view other than that of routine recording or of the teaching of students. Perhaps my experience was a fortunate one, but I was frequently gratified by the real interest shown in the autopsies by the clinicians and I, amongst others, have learned that scientific and professional keenness and enthusiasm can be found in all walks of our profession as sincere as, and no less able than, in the teaching hospital for example. Perhaps the circumstances were often ill-suited to encourage one's clinical colleagues to come to an improvised "mortuary" in a disused hut or in a "160-pounder" tent, or even behind a crude canvas awning in a Normandy ditch! But they came with gratifying frequency—often from inconvenient distances, often ignoring tropical heat, a plague of flies or other such potential excuses—to stimulate with question and observation with no purpose other than scientific curiosity, a curiosity

which was manifestly present in no less measure there than in first-class civilian hospital and teaching units.

Naturally much of the autopsy work had a distinct medicolegal flavour, sometimes frankly so, as when one was called upon to perform autopsies in murder and homicide cases, sometimes potentially so, as in the cases of persons found dead or in accident cases. Interest and responsibility were added in that the Army pathologist, often in a more senior consultant position than his civilian equivalent, was called upon to act in an executive as well as advisory capacity—there was no Coroner from whom advice could be sought : on the contrary one might have to advise the A.D.M.S. what line of action might have to be taken in a suspicious case.

Even in the "ordinary" medical case, the deceased having been a soldier "on active service," it was the least one could do in the exercise of one's duty as a pathologist to apply the most meticulous care in the post-mortem examination and in the preparation of the report, always with the possibility of legal repercussions in view. A careful post-mortem examination could, and often did, disclose unsuspected factors in a case. The deceased's friends and relatives or executors were usually at the other end of the earth, even his doctors and attendants had observed him but for a relative moment within the orbit of his life ; and some day, perhaps, when his documents, having survived the inevitable hazards of time, distance, the elements, the enemy and the great military bureaucratic machine, finally reached a Pensions Tribunal, the observations recorded, and the opinions expressed by the pathologist, might prove crucial to the interests of the deceased's relatives. And so the least the pathologist could do was to observe accurately the dead tissues before assigning them to burial and to record their lesions succinctly, critically and with all the impartiality of which he was possessed.

None of us is infallible at any stage of his experience, but training can do much to minimize our fallibility within a given field. When called upon to give an opinion I think that the Army pathologist feels the conflict between his responsibility and his own inexperience in no department of his work as acutely as in a morbid anatomical problem. On such an occasion Cinderella becomes the beautiful Princess for a brief moment !

In the type of case that might have legal repercussions, interesting preliminary problems would often arise with regard to the preparation of the report. Firstly, there was the question of the authority for the post-mortem. For the pathologist to a military hospital, this was perhaps simple ; such authority was implicit in the C.O. But for the pathologist in charge of an independent laboratory I have often thought the problem a rather tricky one, legally. In actual practice I have never experienced any repercussions on this score, but in semi-legal reports I have always taken the precaution of stating as a preamble "Acting under the authority of the Officer Commanding such-and-such a Hospital," or "of the A.D.M.S. such-and-such a formation." Who does stand *in loco parentis* in the Army ?

Secondly, the question of identification of the deceased might well arise—yet never once in a number of military courts when I have given evidence as

an "expert witness" have I ever been cross-questioned on the identification of the deceased! And yet this identification had often an annoying habit of being obscure. Sapper X was brought in dead, having been found unconscious in a "liberated" café in Normandy, discs missing: vague rumour had it he belonged to No. X Coy., R.E., now careering happily in pursuit of the enemy across the Seine. Or a body, found drowned, clad in British Army uniform, was brought in by the civilian police somewhere in Belgium; the nearest Security Investigation Section was still at Rear H.Q. or elsewhere, but the hospital C.O. wanted the body buried quickly, and passed same to the pathologist "for the necessary action." In that type of case, rightly or wrongly, while advising the notification of the case to the S.I.S. or the A.D.M.S. and having had a personal word on the telephone with my A.D.P., I have usually proceeded to the autopsy and made a careful record of marks of identification on the clothing, body, etc., along common-sense lines as for civilian medicolegal cases.

Thirdly, as in civilian practice, it is obviously desirable to reduce one's report to non-medical language as far as possible having regard to the fact that the lay members of a Court of Enquiry are usually, by virtue of youth and inexperience, much more likely than professional legal men to founder in a sea of medical terminology.

Lastly, one has always tried, with all due regard to the need for brevity, to record impartially under the heading "Post-Mortem Findings" only factual observations made at the autopsy: while the conclusions and opinions drawn therefrom were mustered separately under a conspicuous heading of "Conclusions and Opinion," the statement under which followed some such preamble as "From the foregoing findings, made at autopsy, it is my opinion that, etc., etc."

All that may seem self-evident, but during a period when called upon as acting D.A.D.P. to scrutinize the pathological reports of others one was surprised how infrequently reports were prepared in such a way as to be likely to withstand logical dissection.

My collected records of such interesting cases during the years 1940-1943, spent abroad mainly in India, Assam and the Middle East, and in the B.L.A. (France, Belgium and Norway) from June, 1944, till autumn of 1945, number just over a hundred.

The types of case encountered I shall divide into nine categories and exemplify with cases of special interest:—

(1) CULPABLE HOMICIDE GROUP.

Altogether these numbered six; four in India and two in France, the latter both arising in the American Forces though here one was called upon to perform the autopsies and send in reports. Five of these were frank murder cases. The four Indian cases were all in I.O.R.s—in one the victim had been assassinated with a kukri, in two with rifle shots and in one with a dagger—and in all, evidence had actually to be given in person, once before a Civil Court and on the other occasions before Courts Martial.

In the kukri case the medical testimony was straightforward, as the victim had been almost beheaded, but in this case an interesting defence was maintained that blood on the kukri in question was fowl blood and not human. The military police authorities in Assam pressed for a precipitin test on the dried blood on the knife, but here one had to adopt a firm line that such a procedure was beyond one's powers and experience, and one was obliged to insist that the problem be referred to civil authorities. Experience has taught that one must refuse to undertake examinations which one is legally inadequately qualified to perform. One's testimony can be invalidated at the outset if it can be shown that one has insufficient experience to perform the examination in question.

In one of the G.S.W. cases the defence was submitted that the shot was fired at such a long range that it could hardly have been done with murderous intent. When one was instructed to perform a post-mortem examination the police had indicated that there was no doubt that this was deliberate homicide. Luckily careful measurements and photographs had been made, and careful notes taken as to the absence of tattooing, and one insisted on confining oneself to these observations throughout a somewhat prolonged argument between Counsel as to whether this could have been accidental or not; the medical witness adopted the attitude that he could not claim to be a ballistics expert.

In the other cases the medical evidence was formal, the legal issues apparently being soluble on other grounds.

(2) FOUND DEAD OR DROWNED.

There were four cases, found drowned, and these certainly presented the greatest trouble of all. Firstly, in two there was the problem of uncertain identification in bodies which had been immersed, one in the sea for four or five days in the Tropics; one in a canal in France for a period of probably ten to fourteen days. Secondly, there was the problem of the possibility of contributory causes of death, such as disease or injury, and in the latter event whether accidental or assault.

The other case in the group was that of parts of a body found, some six months after, in the hold of a burnt-out ship; here the problems were manifestly to decide (a) whether death was due to burning and, if so, did this occur at the same time as the ship's fire or had it been put there afterwards; (b) as far as possible, the identity of the corpse. A few unburnt fragments of American service uniform, a skull of apparently "European" type, portions of a male pelvis, femur and tibia were about all that remained.

Another problem case was an I.O.R. who was found drowned after a previous attempt at suicide by smoking datura. He had primary syphilis.

(3) THE POISONING GROUP.

Apart from one case of suicidal datura poisoning the only other cases were deaths following over-indulgence in alcohol. Three fatal cases which occurred together in American enlisted men were due to the drinking of crude wood alcohol.

More interesting were cases allegedly due to drinking of spirits ; in one case the spirit taken was "Calvados," looted from an abandoned dwelling-house, and in the other case it was a cheap cognac from an enemy supply dump. In both cases even senior officers were too prone, it seemed, to consider that death was due to some specially toxic quality of the liquor when in actual fact the liquor taken was only the indirect cause of death, autopsy showing clearly that death was due to asphyxia from inhalation of vomit.

The case of Gunner X is instructive. The man had been missing for twenty-four hours. He was brought in to his unit M.I. Room having been found "unconscious" in a disused billet. An empty Calvados bottle was found by his side. On examination by the Medical Officer he was stuporose and restless, but not aggressive ; with stertorous breathing, a rapid feeble pulse and subnormal temperature, pupils contracted but equal and reacting sluggishly to light. The reflexes were absent : there were no signs of spasticity. The Medical Officer attempted, but failed, to pass a stomach tube and decided to evacuate him to the nearest hospital. The patient was placed, unattended, in an ambulance car ; and on arrival at hospital was found dead.

The alacrity with which all concerned in the case believed that death was due to the particular virulence of the liquor in question was interesting to observe ; the respiratory passages, at autopsy, were full of stomach contents !

A third case in this group had an interesting twist to it.

Driver X, R.A.S.C., driving a large petrol carrying vehicle from the Normandy beachhead to the Belgian frontier stopped outside a roadside inn in France. To avoid obstructing the roadway he turned his vehicle (one with a trailer attached) into a narrow farm road leading past the inn off the main roadway. Having eaten his ration and drunk a toast to victory with the local innkeeper, he decided to set off in the dusk of evening, taking the remaining half-bottle of cognac with him. Reversing into the main road promised to be difficult and he decided to continue down the farm road and rejoin the main road half a mile further on. This involved passing a slight bend which, because of the narrowness of the road, he failed to negotiate, and he ditched his vehicle in the shallow roadside drain. Assistance at that hour was impossible to obtain, so he apparently decided to spend the night in the driving cab, refusing hospitable offers of a bed from a local peasant. In the morning he was found dead at the driving wheel with the empty cognac bottle at his side. The engine was warm and the petrol tank almost empty. Post mortem the body presented the appearances of carbon monoxide poisoning, though alcohol was undoubtedly present in the stomach, and from the evidence presented in Court it appeared probable that he had started the engine during the night (to keep himself warm ?) and had fallen asleep over the wheel ; engine gas could have come up between the loose floor boarding from the little earth pit which the wheels had scoured out in the soft earth.

(4) THERAPEUTIC ACCIDENTS.

In this category one includes two cases of death that occurred within the same week from injection of an organic arsenical in the treatment of early syphilis in two I.O.R.s. Another curious case was a fatal purpura which occurred in an Englishwoman, wife of a British officer, following the injection of an ordinary (" booster ") dose of typhoid paratyphoid vaccine. Into this category, too, fall two cases of genuine air embolism, one following an attempt at suction drainage of an amœbic abscess of liver and the other following careless handling by an orderly of a plasma transfusion set in a C.C.S. in Normandy.

In the latter case a bottle of plasma was fitted to the infusion set to replace a complete empty *saline* bottle ; the set was of an older pattern with rather wider and longer rubber leads than normally, the potential capacity of these alone between bottle and arm being between 12 and 15 c.c. A failure of the plasma to drip was "corrected" [*sic*] by the nursing orderly, who applied a positive pressure by pumping in a good head of air above the plasma with the aid of a Higginson's syringe. The air imprisoned between the plasma bottle and the needle was thus forced into the vein.

Other therapeutic accidents occasionally encountered were two cases of suppurative spinal meningitis following spinal anæsthesia and lumbar puncture.

All such cases put a good deal of responsibility on the shoulders of the pathologist and demand a tact and discretion sometimes beyond his years and standing, especially when one bears in mind the close domestic relationship into which he comes with his clinical colleagues.

(5) ANÆSTHETIC DEATHS.

These were, happily, remarkably few—in fact only two, which were due to undoubted idiosyncrasy to pentothal sodium. One other case was the death under nitrous oxide and ether anæsthesia for the treatment of hæmorrhage from assault wounds, both the hæmorrhage and the wounds generally being relatively trivial.

(6) "ENEMY ACTION" OF OBSCURE NATURE.

Many and varied were the wounds that presented apparently inexplicable features, and these from time to time aroused the strangest suspicions of new toxic agents in missiles. The first case of fat embolism which came to autopsy in Normandy had aroused the most ingenious speculations !

Fulminating anaerobic infectious wounds twice caused "obscure" deaths. One of these which presented itself as an acute mania within a few hours of wounding had a "foamy" liver and gross gas changes in all the organs including the brain within two hours of death. In the other remarkable case occurring in Normandy in a B.O.R. with shell wounds, a curious rigidity of the limbs resembling rigor mortis, observed in a very toxic patient a few minutes before death, ushered in a generalized and immediate rigor mortis after death : this was almost certainly a fulminant tetanus infection.

(7) ACCIDENTAL TRAUMA.

These naturally formed a fairly high proportion of the cases of medicolegal nature ; on the one hand the cases of gross skeletal and visceral injury needing only a formal report that death was "due to the direct effects of hæmorrhage and shock from the injury : there were no other contributory factors." A high proportion are head injuries.

But in this group the real interest lay in the relatively high proportion of cases where death was the unexpected result of an apparently trivial injury, e.g. a blow on the abdomen resulting in the rupture of an apparently healthy spleen.

A case of this type was that of L'Cpl. X, of the C.M.P., athlete and physical training instructor of his unit, a robust muscular subject of 30, previously fit and well. Suddenly, while demonstrating a simple jumping exercise, he fell backwards for no obvious reason

and struck the back of his head on the ground. When picked up he was found to be unconscious and died some two hours later. At autopsy there was light bruising of the scalp over the occipital region, but inside the skull quite a considerable hæmorrhage in the subarachnoid space round the medulla. Careful examination of the skull and of the atlas and axis vertebræ revealed no fracture and no tear of the dura. The actual source of the hæmorrhage was not found—it was certainly not from any of the major vessels in the vicinity—and the cerebral vessels showed no congenital aneurysm formation nor any atheroma. As far as the writer is concerned, the mechanism of the injury is still a mystery—I have always felt that in this case (having regard to the statement given by witnesses) the patient had some intracranial catastrophe first, before falling, and that the subgaleal hæmorrhage was due to direct impact on the ground but that the intracranial hæmorrhage was caused in some other way—as by bulbar impaction due to a bad landing during the jumping exercise.

(8) THE OBSCURE “MEDICAL” DEATHS AND THERAPEUTIC FAILURES.

These, of course, formed the most numerous and varied group, and in India and Assam at least covered a wide field of medical and tropical diseases which was an educational course in itself. There were the cerebral malarias, the anæmias and the typhoid fevers that seemed to defy what should have been the most timely treatment. And there were the inevitable clinical mistakes, each a lesson in itself, such as this :—

Pte. X, aged 35. Treated for amœbic dysentery in Iraq and pronounced cured. Over a year later in Iraq he developed upper abdominal pain. Examination revealed an epigastric mass, apparently solid. A routine examination of the stool on two occasions disclosed “no amœbic cysts.” A clinical and radiological diagnosis of tumour of the stomach was agreed upon and laparotomy performed. This revealed a large “cancer of the stomach already adherent to the liver,” regarded as inoperable by the surgeon. The case was transferred to base and reconsidered by a consultant surgeon. Laparotomy was repeated; mass “larger and now definitely inoperable.” The patient was evacuated to India—a hopeless case. Patient was grossly emaciated and the laparotomy wound beginning to break down from secondary cancerous invasion. He died shortly after admission to hospital in India. At autopsy, the “mass” was an amœbic abscess of the left lobe of the liver with inflammatory adhesion to the stomach wall; there was advanced active amœbic colitis; and the “secondaries of the abdominal wall” were nothing other than entamœbal lysis of the abdominal wound.

(9) THE “UNSOLVED MYSTERIES.”

Inevitably, there are a few cases the unlaidd ghosts of which stalk in one's memory; some clue was missed either clinically or at autopsy, or the range of personal experience either of clinician or pathologist was not just wide enough to compass this odd variant of some otherwise “common” disease. At all events, some aspect of it remains unsolved. One recalls in this connexion the two obscure cases finally reported as “encephalomyelitis,” one of a Landry type, occurring at the time when one's facilities for histological work were inadequate.

The foregoing is of necessity a somewhat sketchy review of an Army pathologist's experience in the field of morbid anatomy and forensic pathology, but one likes to feel that even amidst the distractions of active service in various foreign fields and amidst the more immediate and urgent problems of the

campaign or the actual battle, we were able to pursue truth for truth. —
Though we “grouched” at the time, in retrospect we must admit that the frequent lack of static laboratory facilities was no real impediment to pathological investigation. Most of us found in ourselves unexpected powers of compromise and improvisation in this as in other fields of work and endeavour!

I have much pleasure in acknowledging my gratitude to Brigadier J. S. K. Boyd, *O.B.E.*, Director of Pathology, for his permission to forward this paper.

GLANDULAR FEVER, B.A.O.R., 1945.

BY

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[Received March 25, 1946.]

THESE notes concern cases admitted to a General Hospital in Brunswick. The first appeared in September and there was a steady increase in number up to the end of October when the incidence diminished and, by mid-December, the frequency was down to three cases per week. The following relates to the October-November epidemic group of 84 cases recognized on hæmatological grounds.

The age incidence was of no statistical significance in an Army community.

CLINICAL GROUPS.

Anginose, 77 cases ; abdominal, 3 cases ; thoracic, 2 cases ; with hepatitis, 2 cases.

The frequency of the major physical signs was : general glandular enlargement, 12 cases ; local glandular enlargement (usually cervico-axillary), 72 cases ; spleen palpable, 7 cases ; evanescent maculo-papular rash, 2 cases ; jaundice, 2 cases.

Clinical Aspects.—Sore throat was the complaint in 77 cases out of 84. Not infrequently a history of repeated mild sore throat was given. Malaise was often absent and fever was slight and sometimes absent. The throat lesions included pharyngitis, follicular tonsillitis and occasionally a friable membrane. The duration was two to four days. All were swabbed and the findings were : heavy Vincent's infection, 1 case ; scanty Vincent's infection, 5 cases ; *S. hæmolyticus*, 8 cases.

Abdominal Types, 3 cases.—Two had slight fever and lower abdominal discomfort. Glands became palpable later. The third was enteric in type and had three weeks' fever (99-101) and a leucopenia of 2 : 400. At first the blood picture was lymphocytic but, later, atypical cells appeared and glands became palpable.

Thoracic Type, 2 cases.—One presented with pleuritic pain, cough and dyspnœa suggesting pneumonia but the blood picture and later appearance of glands gave the correct diagnosis.

The second had pyrexia and signs suggesting pericarditis and pleurisy. The blood picture was diagnostic. (WBC 4,600 with 33 per cent of atypical cells.) Both these cases recovered in a few days.

Hepatitis.—Two cases clinically resembled infective hepatitis but the blood picture was diagnostic. (WBC 9,600 with 26 per cent of atypical cells and WBC 11,600 with 50 per cent of atypical cells.)

Relapse.—Only one true relapse was noted but several complained of not feeling quite fit after a month.

The Blood.—The total leucocyte count averaged 8,000 with extremes of 2,400 and 24,600. The greatest percentage of atypical cells was 84.

The atypical cells are lymphocytes and the changes are both nuclear and cytoplasmic. The nucleus enlarges, the chromatin rarefies and indentation progressing to lobulation occurs. Nucleoli are uncommon and mitoses rare but the latter were found in four cases of this series. The cytoplasm increases in amount, loses clarity and acquires an increased basophilia. Pseudopodia and vacuoles are common. The azurophil granules increase in number and size and an unusual form about one micron in diameter is pathognomonic.

Any combination of these nuclear and cytoplasmic changes may occur but there is a differentiation into two broad hæmatological types—not related to Downey's [1] analysis.

Type 1.—Considerable pleomorphism with a predominating monocytoid appearance.

Type 2.—A more uniform cell type—atypical large lymphocytes—lymphocytoid predominance.

In general, leucocytosis over 10,000 indicated mainly Type 1 cells while a count of 5,000 to 10,000 yielded a mixture of Types 1 and 2, and a leucopenia under 5,000 indicated Type 2. Thus to some extent pleomorphism is proportional to the output of atypical cells.

Other points noted in the blood picture of this series were :—

- (1) Absolute neutropenia is occasionally seen.
- (2) Eosinophils and basophils may be slightly increased.
- (3) True monocytes are diminished in numbers.

(4) Cases examined after clinical recovery in the fourth and fifth weeks sometimes showed the blood picture of the acute stage in even more pronounced form. Cases which were clear of the atypical cells showed a rise in normal large lymphocytes and a corresponding drop in the small lymphocytes, sometimes reversing the usual ratio of four or five small to one large.

(5) In the acute stage this reversal of lymphocyte type may also occur and it precedes the diagnostic picture.

THE PAUL-BUNNELL TEST.

In view of the results obtained it is well to give a brief account of the technique used [2].

To 0.5 ml. quantities of the dilution of inactivated serum 1.5 ml. of 0.6 per cent suspension of sheep cells is added. The cells were three to five days old. The tubes are shaken and placed in a 37°C. water bath for one hour and then in the refrigerator overnight. In the morning the tubes are gently inverted three times and macroscopic agglutination is considered positive. The titre recorded is the final dilution after adding the sheep cells. The test must be strictly standardized.

Ox cell absorption was done but guinea-pig kidney was not available.

Twenty cases were tested between the third and the twenty-first days and a titre of 1 in 20 was never exceeded. Ten were tested in the fifth week and three gave titres of 1 : 80, 1 : 80, and 1 : 160. The remainder gave a titre of 1 : 20 or less. The cases were drawn from such a wide area that an extensive follow-up was not practicable.

THE ORIGIN OF THE ATYPICAL CELLS.

It is now generally agreed that these are lymphoid in origin. The simplest explanation is that both lymphocyte and monocyte have a common precursor whose ultimate differentiation is possibly determined by its geographical site in the lymphoid architecture, and that the stimuli responsible for the glandular fever syndrome distort both lines of syntheses and cause the production of a variety of cells which have both lymphocytic and monocytic characteristics.

SUMMARY.

Eighty-four cases of glandular fever are briefly considered and their clinical and hæmatological group qualities noted. An important feature is the very frequent absence of generalized adenitis. If the blood of all patients with a sore throat had not been examined most of these cases would have been missed. The clinical manifestations are protean and the disease cannot with certainty be regarded as a single entity. No one hæmatological detail is unequivocal and while some films are obvious others require a careful assessment of individual cells. The occurrence of remarkably large granules in otherwise more or less normal lymphocytes is a valuable point in the recognition of the leucopenic lymphocytoid type.

I am very grateful to Brigadier Tonbridge, Consultant Physician, for helpful criticism and to Lieutenant-Colonel Howat, R.A.M.C., for offering me all facilities in his Medical Division.

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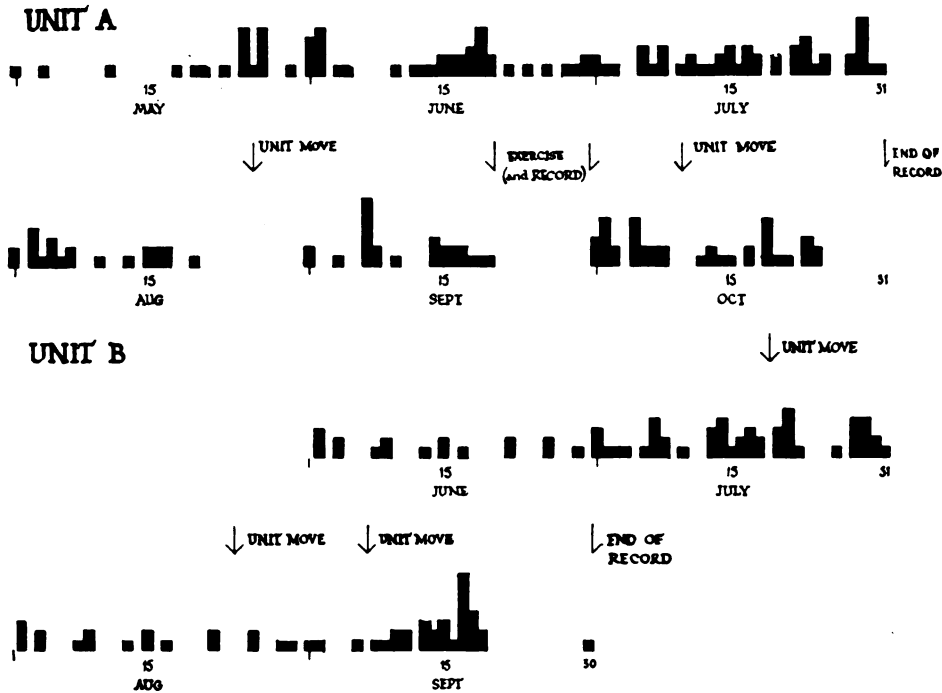
ENDEMIC DIARRHŒA.

BY

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[Received May 5, 1946.]

THE state of affairs described in this paper came to light during the investigation of a small outbreak of infection with *Shigella sonnei* in an infantry battalion. Enquiry into the recent medical history of the unit showed that diarrhœa had been a remarkably frequent cause of temporary disability for several months. No cause for this was discovered and comparison with other units revealed striking differences in this respect. The purpose of this paper is to discuss the incidence of diarrhœa and to attempt to suggest some reasons for the variations in incidence.

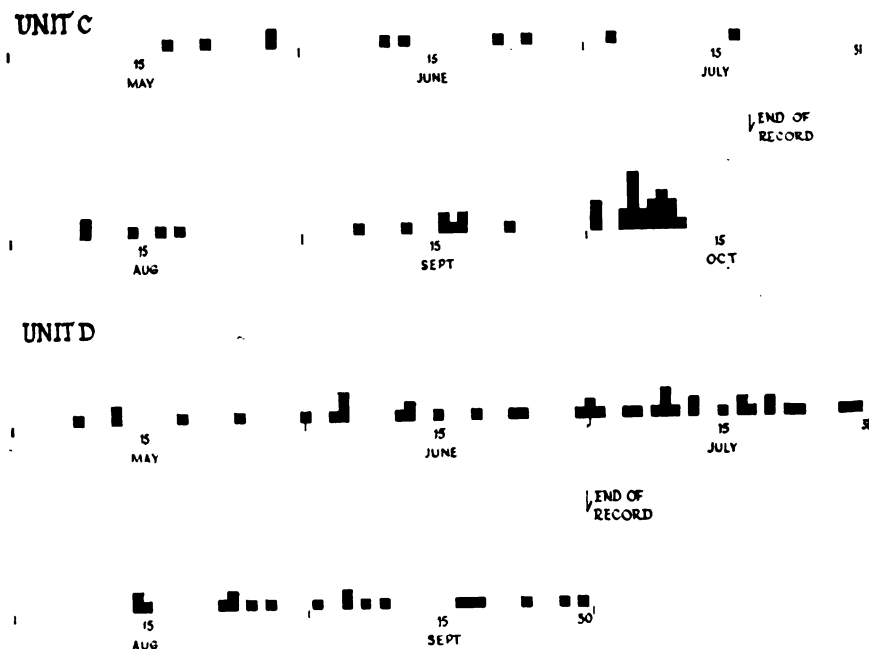


Material.—Units A and B were “Young Soldier” battalions made up of volunteers aged 16½ to 19 with a sprinkling of older men. Both were noticeably smart with a high standard of discipline and turn-out and great keenness in training. The units employed for comparison were Corps troops under training in the same district; data were also obtained from a company of A.T.S. and an R.A.F. station.

X and Y are small seaside resorts. The units were scattered through the towns in billets and requisitioned halls. Company Messes were far apart.

Both towns were richly supplied with small cafes, much frequented by the men, and social intercourse with the inhabitants was widespread. Z was a market town about a hundred miles away where intercourse with civilians was less frequent and opportunities for outside amusement less plentiful. Units D and E were in hutted camps near X. The training camp was to all intents isolated from civilian contacts.

Methods.—Fæces were usually collected in glycerol-saline, and all specimens cultured on desoxycholate-citrate agar and on MacConkey agar. No benefit was found in the use of the latter but in view of the large number of specimens from which no pathogenic organisms could be recovered it was thought wise to employ a less selective medium in addition to desoxycholate-citrate agar.

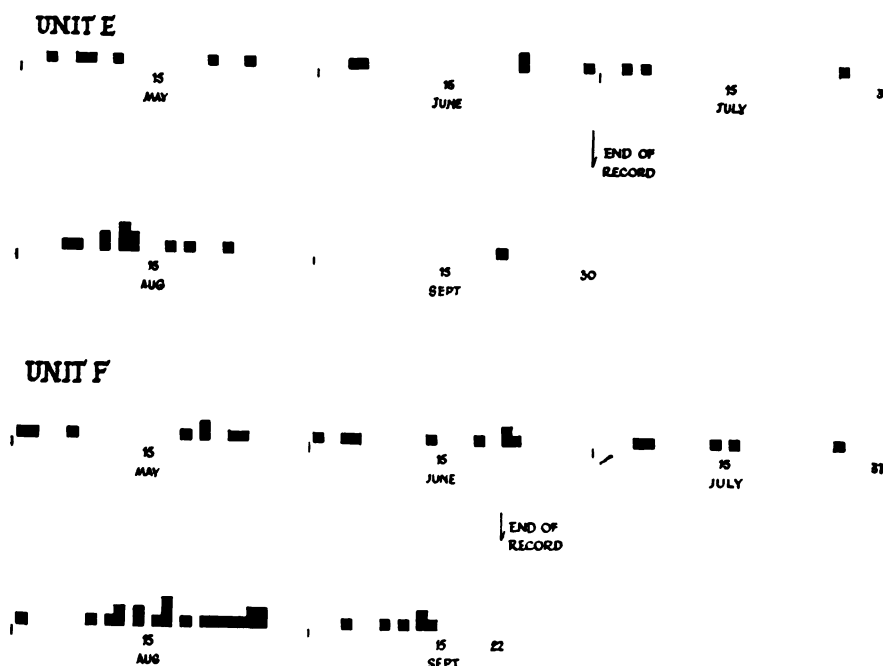


When it was realized that the incidence of diarrhœa in A and B was higher than in other units it was decided to examine at least one specimen from every man reporting sick with diarrhœa in those units. This was possible so long as these units were stationed in X and Y and, thanks to the co-operation of the Medical Officers, in most cases specimens reached the laboratory within two hours of being passed.

History.—Unit A was under observation from May 1 until October 24. Until August 26 it was in X; from then until October 10 at the training camp whence it returned to occupy the quarters in Y previously held by Unit B.

In the last week of June eight men from Unit A were admitted to hospital with severe diarrhœa and from three of these *Shig. sonnei* was recovered.

A search for sources of infection among the cookhouse personnel revealed three men with mild diarrhoea from whom the same organism was isolated. All these were free of infection within a few days and no chronic carrier was found. Enquiry revealed that the number of men reporting sick with diarrhoea since May 1 averaged 1.16 per mille per diem. From July 1 until August 26 the faeces of the majority of men reporting sick from this cause was examined bacteriologically; no specifically pathogenic organisms were found but during this time the incidence of diarrhoea averaged 1.56 per mille per diem. Clinically, the cases showed typically a liquid diarrhoea without blood or mucus that lasted forty-eight hours. The daily incidence at the training camp remained high but no bacteriological examinations were possible. When the

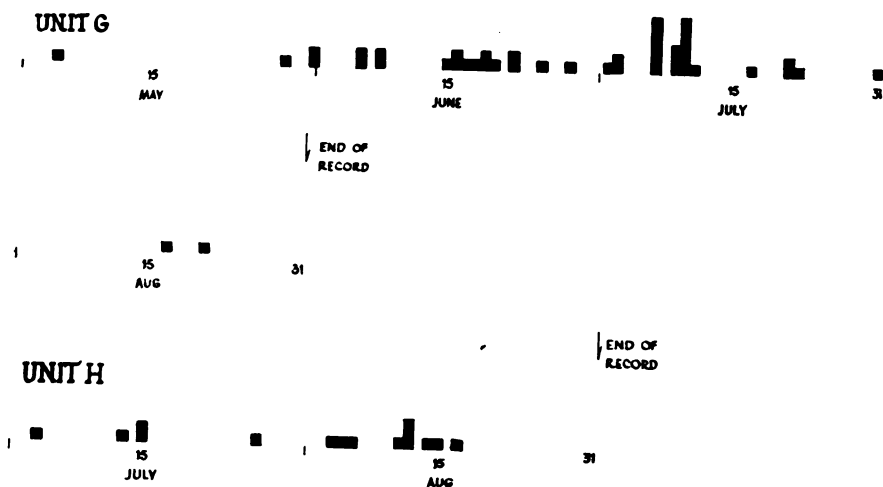


unit returned to Y the incidence of diarrhoea was unchanged but within fourteen days specific infections with *Shig. flexner* Z (2 cases) and *Shig. flexner* 103 and *Shig. sonnei* (1 case of each) were detected. During the period when this unit was under observation, sick returns were available for 163 days and 190 men reported sick with diarrhoea, an average of 1.45 per mille per diem.

This figure appeared unduly high and to obtain a standard of comparison it was decided to obtain returns and specimens from Unit B. Unit B had been in Y from May 1 until July 19; from then until August 24 it was in the training camp later occupied by Unit A; it returned to Y until September 7 and then moved to Z. Sick returns were available from June 1 until September 30 during which time the incidence of diarrhoea averaged 1.59 per mille per

diem. During July seven cases of infection with *Shig. sonnei* were diagnosed bacteriologically but no other specific infections were found.

Data for further comparison were sought among other units in the area. Unfortunately much of this was obtained retrospectively and no systematic bacteriological examinations were possible; unit and laboratory records, however, provided evidence of a few specific infections. Unit C was until September 2 in Z where the incidence of diarrhœa was 0·15 per mille per diem. The unit then replaced Unit A in X where the incidence rose to 0·34 per mille per diem until the end of the month. Thereafter 24 cases occurred within twelve days, from none of whom could specifically pathogenic organisms be recovered. Since the incidence in Unit C appeared to be rising it is unfortunate that further records could not be obtained. Except when absent on exercises Units D and E occupied the same camps from May 1 until September 30.



In the former the incidence during this period was 0·39 per mille per diem; two infections with *Shig. sonnei* were reported. In the latter the incidence was 0·18 per mille per diem over the same period. Unit F was an R.A.F. station. The incidence of diarrhœa during the months May to September was 0·2 per mille per diem; one case of infection with *Shig. shiga* was found. Unit G, an A.T.S. Coy., showed an incidence of 0·49 per mille per diem between June 1 and August 31. Records from Unit H are limited to two months but are included since during that period five infections with *Salm. typhi-murium* occurred with no obvious effect on the total number of men reporting sick with diarrhœa; the incidence was 0·38 per mille per diem.

The specifically pathogenic organisms recovered are shown in Table I, and the incidence of diarrhœa in Table II. The chart records the number of men reporting sick without reference to the number at risk.

TABLE I.—PATHOGENIC ORGANISMS RECOVERED FROM PERSONNEL OF UNITS UNDER EXAMINATION.

Organism	Unit	No. of cases	Date
<i>Shig. sonnei</i>	A	7	June 20-30
	A	1	Oct. 17
	B	7	July 7-28
	D	2	Aug. 10-15
<i>Shig. flexner</i> Type Z	A	2	Oct. 17-23
	Type 103	1	Oct. 17-23
<i>Shig. shiga</i>	F	1	July 27
<i>Salm. typhi-murium</i>	H	5	July-Aug.
<i>Bact. alkalescens</i>	}	Recovered from A and B occasionally but not considered pathogenic	
<i>morgani</i>			
<i>dispar</i>			
<i>asiaticus</i>			

TABLE II.

Unit	Description	Period of record	Incidence of diarrhoea (per mille per diem)
A	Infantry	May 1 - Oct. 31	1.45
B	Infantry	June 1 - Sept. 30	1.59
C	R.F.	May 1 - Oct. 16	0.46
D	R.A.S.C.	May 1 - Sept. 30	0.39
E	Pioneers	May 1 - Sept. 30	0.18
F	R.A.F.	May 1 - Sept. 30	0.20
G	A.T.S.	June 1 - Aug. 31	0.49
H	R.E.	July 1 - Aug. 31	0.38

DISCUSSION.

Since the admission to hospital of men infected with *Shig. sonnei* first called attention to the high incidence of diarrhoea in Unit A, it was assumed that the cause of this incidence was a specific bacterial infection. Later consideration made this appear unlikely. For several weeks the faeces of almost every man reporting sick with diarrhoea were examined bacteriologically under conditions favourable to the isolation of any members of the genera *Shigella* or *Salmonella* that might have been present. None was found, either in acute cases or in the cookhouse staff suspected of being carriers. Where infection with *Shig. sonnei* is widespread the incidence tends to be explosive (Boycott, 1946). The neighbouring units D and E were as liable to infection from an indirect source as A and B. All shared a common water supply which was tested periodically in connexion with this enquiry and never found to give a presumptive coli count of more than 2 organisms per 100 ml. Bulk rations were drawn from the same source by all units. Boiling all milk consumed in A and B had no effect on the incidence of diarrhoea. A cafe that fell below the mediocre standard of cleanliness of these establishments in X and Y was put out-of-bounds for three weeks with no obvious effect.

On two occasions the faeces of men in Unit A were found to contain *Staphylococcus aureus* but it was not possible to test these strains for the

production of enterotoxin. Bread for all units in the neighbourhood came from an Army bakery and it was suggested that the diarrhoea might be mechanical in origin since the bread was usually damp and "lumpy." It was of interest that *Staph. aureus* was recovered from two out of six loaves examined bacteriologically.

The possibility of chemical poisoning was considered but analysis failed to show any irritant poisons in the water on several occasions.

That the high incidence of diarrhoea among these few units was limited to the "Young Soldiers" battalions suggested that the difference might be attributed to causes of morale. If this is so it is outside the scope of this paper. Nevertheless it was impressive that a series of Medical Officers attached to Units A and B agreed that keenness and personal cleanliness in those units were far above the average.

If the negative bacteriological findings in Units A and B are accepted there seem to be four possibilities which may explain the higher incidence of diarrhoea in these units.

(i) An undetected infection. More attention should have been paid to the isolation of staphylococcus in view of the findings in the bread which were made towards the end of the investigation. It is possible that the organisms of the para-colon group which were recovered frequently may have had some ætiological significance, as has been suggested recently by Sevitt (1945). A viral origin was not considered at the time but Reimann and his colleagues (1945) have brought forward evidence which suggests that such a cause must be kept in mind in tracing the ætiology of mild diarrhoeal attacks.

(ii) Continual sporadic infection from civilian sources which for some reason never became epidemic within the units. It was remarkable that within a few days infection with two sub-species of *Shig. flexneri* should occur in the same unit, but at times when dysentery is prevalent simultaneous infection with two or more organisms seems to be not uncommon (Adams and Atwood 1944).

(iii) Irritant poisoning from some undetected source, e.g. cooking utensils.

(iv) The possibility that younger men are more prone to looseness of the bowels from any cause, such as psychological disturbance or dietary indiscretion.

None of these explanations are entirely satisfactory. It is a matter of regret that the investigation ended when it did and it is hoped that further records of the incidence of diarrhoea will be obtained.

SUMMARY.

It was noticed that the incidence of diarrhoea as recorded by daily sick returns was considerably higher in some units than in others. No satisfactory explanation was forthcoming.

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Clinical and Other Notes.

A REMARKABLE CASE OF MEDIASTINAL NEOPLASM.

BY

Major R. S. VINE,
Royal Army Medical Corps.

[Received July 29, 1946.]

IN view of the exceptionally widespread invasion of the myocardium by new growth, this case of lymphosarcoma of the mediastinum is worthy of record.

History.—The patient was a heavily built muscular young man of 30 who had served five and a half years in the Army. Apart from three or four attacks of malaria in Burma and two relapses in England during 1945, his past health appears to have been good. Towards the end of February, 1946, he began to feel generally unwell, complaining of headaches and generalized body pains. On March 1 he developed pains on either side of the lower chest, accompanied by a dry cough and vomiting. The following day he was admitted to the Royal Herbert Hospital, Woolwich, as a suspected case of early bronchopneumonia.

On examination he looked very ill, with severe dyspnœa, and a pulse of 120. The temperature was 100° F. Rales were heard throughout the chest, with crepitations at both bases. The heart sounds were very soft but no murmurs were heard. B.P. 100/65. At this stage there was no œdema of the ankles.

During the next few days it became clear that the patient was suffering from early cardiac failure, and signs of bilateral pleural effusion appeared.

Special Investigations.—W.R. and Kahn negative. Blood culture sterile. Throat swab—no pathogens. Pleural fluid clotted when aspirated and proved sterile on culture.

Ray of chest (portable) showed widening of the mediastinal shadow and a grossly enlarged heart, more suggestive of cardiac dilatation than of pericardial effusion (fig. 1).

Progress of Case.—During the succeeding five weeks the patient's general condition fluctuated, not merely daily, but even hourly, although with a progressively downward trend. In view of the subsequent findings, it is of interest to record his general demeanour. He wore a perpetual wide-eyed anxious expression, the features varied from lilac to ashen-grey, the breathing was rapid and grunting, the forehead bathed in sweat—particularly after inhaling oxygen through a B.L.B. mask. (He was allowed to help himself to oxygen whenever he felt an urgent need, but this brought him less relief than was expected.) He was apprehensive and "temperamental," constantly asking the Medical Officer to let him go out, let him get up, let him go to the annexe instead of using the bed-pan, etc. He complained not so much of pain in his chest as of a sense of oppression, a fighting for breath and a desire for all the windows and doors to be kept wide open. He had occasional violent attacks of coughing and vomiting, which left him very exhausted. As the condition progressed, the cough became more and more productive, and in the last week of life the sputum was increasingly blood-stained, and was examined for T.B. with negative results. After the first two days the temperature subsided and remained normal throughout. As regards *physical signs*, the pulse was generally regular in the early stages, of normal rate and fair volume. At times it became markedly irregular in *volume* but frequently remained almost normal for long intervals. Towards the end it was irregular in rate and of very poor volume. Clinical examination of the heart showed that the apex beat was unpalpable and the area of cardiac dullness indefinite. Heart sounds were faintly audible one inch below and medial to the left nipple, the first and second sounds being equal in force, and

not accompanied by murmurs. In other areas the heart sounds were quite inaudible. The patient remained free from demonstrable dependent oedema until just before death.

Three weeks after admission, two pints of clear, straw-coloured fluid, which clotted solid, were aspirated from the left pleural sac. A citrated specimen was found to contain a few red blood-cells, no leucocytes, and was sterile on culture. The E.S.R. at this time was 6 mm. after one hour (Westergren). Following aspiration of the chest, an area of subcutaneous emphysema gradually spread from the site of the puncture over the left side of the chest. During the fourth week of illness, a crop of purplish spots appeared along the left costal margin and over the epigastrium, which on closer inspection proved to be dilated venules. The blood-flow was from above downwards.

The patient became increasingly restless and had to be given morphia. On the evening of his death he became even more dyspnoeic and mentally confused, the pulse rapid and almost imperceptible, the heart beats very feeble and grossly irregular, the lungs full of rales and rhonchi. A few hours later (May 9, 1946) he died, six weeks after the outset of symptoms.

Post-mortem Findings (Major J. W. Lacey, R.A.M.C.).—"Chest: No pneumothorax found. Both pleural cavities contained a massive effusion of clear, straw-coloured fluid, about 2 pints on each side. Both lungs were partially collapsed. The whole mediastinum was filled with a firm, yellowish-white homogeneous mass, which extended from the superior border of the sternum, covering the entire pericardium, to the diaphragm. The mass was firmly adherent to the sternum, and completely surrounding the great vessels of the heart, including the superior vena cava. Into this latter vessel a large mass was projecting, the lumen being almost entirely occluded by it.

"No pericardial space could be found, and the whole pericardium was filled with the growth, being continuous with the mass surrounding the great vessels. The growth was firmly adherent to the myocardium, and in many places it had infiltrated into the muscle and appeared in the endocardial surface; this was most marked in the right auricle. The valves of the heart appeared normal.

"The lungs showed small nodules of bronchopneumonia but were otherwise normal. No neoplastic deposits were found, apart from those at the hila. The trachea and oesophagus were adherent to the mediastinal mass, but not apparently infiltrated.

"The other organs showed venous congestion only."

Histology (Major J. W. Lacey, R.A.M.C.).—"A section of the growth shows a mass of small round cells with little or no cytoplasm. The nuclei are not uniform in size or staining, many have an open chromatin network, while others are small and pyknotic. The section is consistent with a diagnosis of lymphosarcoma of the mediastinum."

DISCUSSION.

The interest of this case lies in the contrast between the short clinical history and the extent of the pathological lesion. One does not ask, "Why did the patient die?" but "Why did he live so long?"

It should be remembered that (1) both auricular walls consisted of thick and rigid layers of growth, while both ventricles were extensively replaced or invaded by tumour; (2) that the pericardial sac was obliterated by adhesions and the pericardium itself stiffened by neoplastic plaques; (3) that the superior vena cava was almost entirely occluded by growth; (4) that the lungs were embarrassed by 2 pints of fluid in each pleural sac, not to mention the terminal bronchopneumonia. When all these factors are weighed together it is almost unbelievable that the patient should have survived long enough to produce the pathological picture described.

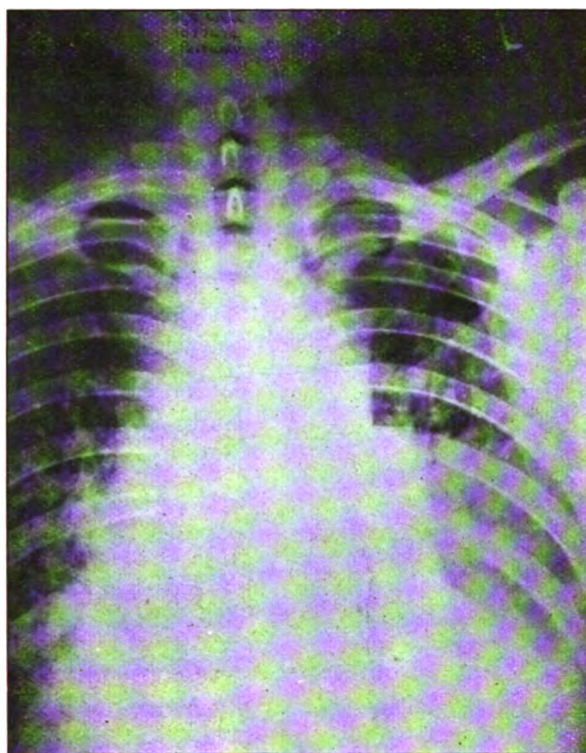


FIG. 1.—X-ray of chest showing enlarged mediastinal and cardiac shadows.

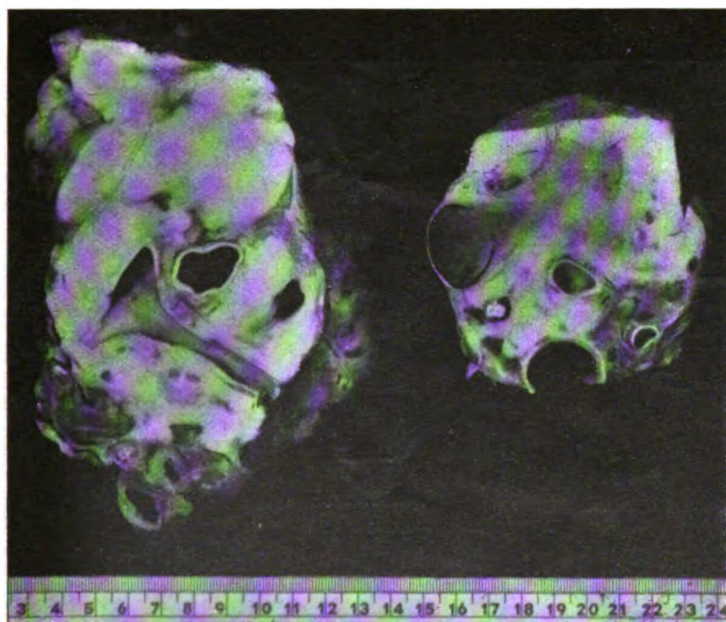


FIG. 2.—Horizontal section of mediastinal growth showing tumour surrounding aorta and pulmonary vessels. Smaller specimen shows occlusion of superior vena cava by growth.

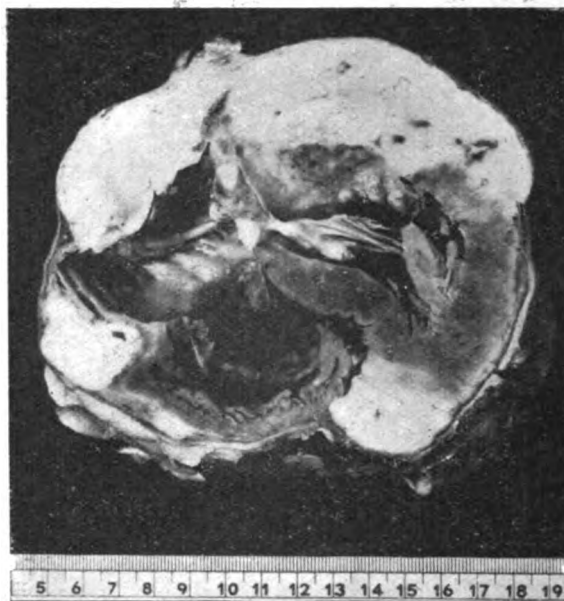


FIG. 3.—Vertical section of heart showing extensive invasion of myocardium.

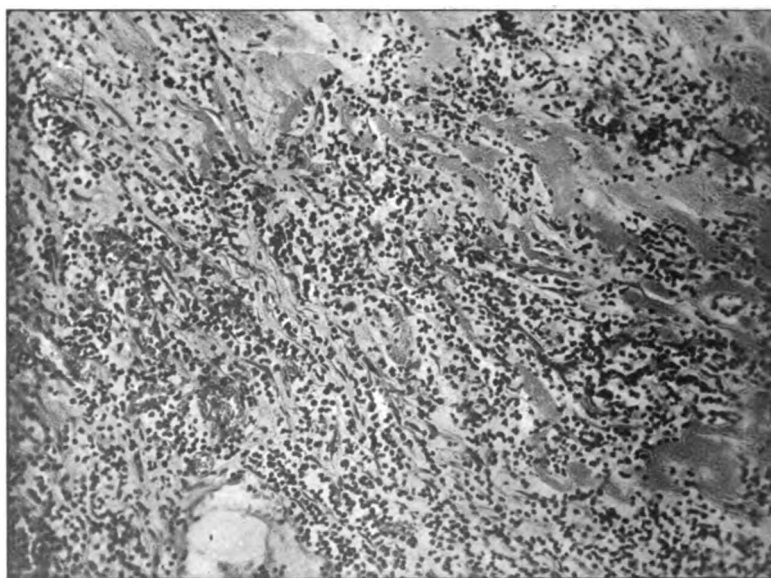


FIG. 4.—Photomicrograph showing myocardial fibres invaded by tumour cells (X 150).

My thanks are due to Dr. Alan Morgan and the Staff of the Pathological Department, the Westminster Hospital, without whose help and co-operation the photography would have been very difficult. The photographs of the gross specimens were taken by Dr. Peter Hansell, of the Department of Medical Photography at the Westminster Hospital, and the photomicrographs are the work of Mr. F. Wilson of the John Burford Carlile Pathological Laboratories, Westminster Medical School.

I wish to acknowledge my indebtedness to Major J. W. Lacey, R.A.M.C., Pathologist, Royal Herbert Hospital, whose interest encouraged me.

Finally my thanks are due to Colonel C. O. Shackleton, O.B.E., Officer Commanding the Royal Herbert Hospital, Woolwich, for permission to forward this paper.

A PENICILLIN INJECTOR.

BY

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AND

Serjeant D. P. JONES,

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[Received July 19, 1946.]

THE discomfort of three-hourly penicillin injections is an obvious disadvantage of this form of therapy, especially in the prolonged course necessary for the treatment of subacute bacterial endocarditis.

The following simple apparatus has been devised and used with success in a Military Hospital for routine penicillin therapy, and is at present being used in a case of subacute bacterial endocarditis. It is a modification of an appliance described recently by Gayar, *B.M.J.*, March 16, 1946, page 394.

The apparatus can be made easily in a few minutes, so breakage does not matter (no Breakage Forms to be rendered !), and nocturnal injections, by a light-fingered Sister, can be performed without waking the patient. The latter is the main advantage and is appreciated by patients on a long course of therapy.

The parts are :—

- (1) A strong intramuscular hypodermic needle (e.g. 5 c.c. serum needle, 21 G \times 1 $\frac{3}{8}$ inches).
- (2) A piece of stout walled natural rubber tubing (e.g. Size No. 12, bore 7/32 inch and wall 1/16 inch) 2 inches long.
- (3) A piece of glass tubing (e.g. 5.5 to 6 mm. diameter) 2 $\frac{1}{2}$ inches long.

The glass tube is sealed and rounded at one end and carefully sealed at the other end, to form a small bulb. The bulb forms the head or handle of the

plunger (fig. 1). The rubber tubing should fit the collar of the needle and the plunger tightly to prevent leakage, but not so tightly that the plunger cannot be moved up and down, like the plunger of a syringe.

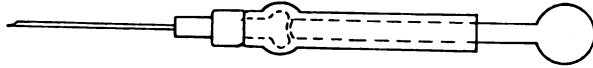


FIG. 1.

The apparatus is sterilized by boiling. The area to be used is shaved and sterilized (the lateral aspect of the thigh is most suitable) and the needle thrust deeply into the muscle. A collar of collodion is painted round the needle at its entrance through the skin and the apparatus is secured with a collar of adhesive tape. The plunger is pulled back about $\frac{1}{2}$ inch, an area of the tubing is cleaned and the penicillin injected through the tubing with a syringe and fine needle, care being taken that the needle is inserted diagonally to prevent leakage after the tube has been punctured several times, then the plunger is pushed home (fig. 2). The glass plunger is covered with a swab and strapping

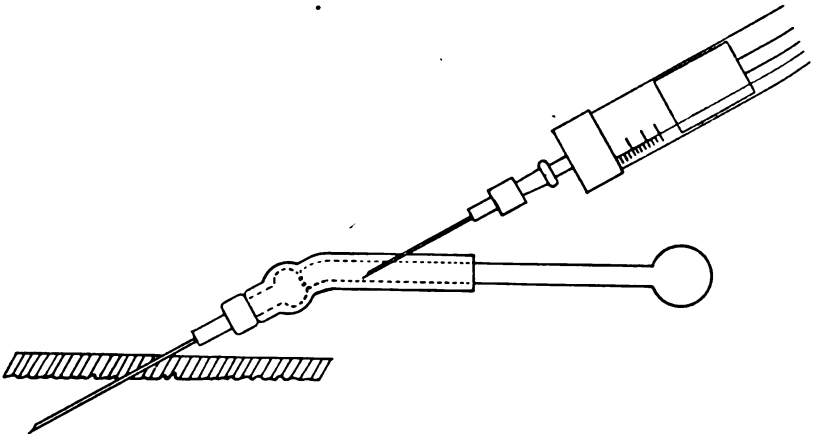


FIG. 2.

until the next injection. It is advisable to remove the injector and needle, re-sterilize it, and change the site once in twenty-four hours. This prevents the area becoming too painful and lessens the risk of sepsis.

Shaving a fairly wide area prevents disturbing a sleeping patient when removing the swab and strapping. An apprehensive patient does not like the idea of an indwelling needle, but after twenty-four hours of three-hourly injections, he welcomes it, and is very pleased to change to the new system.

Our thanks are due to Colonel T. I. Dun, *D.S.O.*, *M.C.*, *O.C.* Military Hospital for Head Injuries, Wheatley, Oxford, for permission to forward this note.

Reviews.

A POCKET SURGERY. Second Edition. By Philip H. Mitchiner, *C.B., C.B.E., M.D., M.S., F.R.C.S.*, and A. Hedley Whyte, *D.S.O., M.S., F.R.C.S.*
London : J. & A. Churchill, Ltd. 1946. Pp. vii + 272. Price 8s. 6d.

Three years after the first edition appeared there has been a call for a second edition of this small volume by Major-General Mitchiner and Brigadier Hedley Whyte.

It follows the plan of arrangement of "Science and Practice of Surgery," by Romanis and Mitchiner, and condenses into small space a great deal of material. It can easily be slipped into a pocket, and will be found very helpful by Service medical officers generally. D. C. B.

TEXTBOOK OF MEDICAL TREATMENT. Fourth Edition. By D. M. Dunlop, *B.A.Oxon., M.D., F.R.C.P.Edin., M.R.C.P.Lond., L. S. P. Davidson, B.A.Camb., M.D., F.R.C.P.Edin., F.R.C.S.Lond., and J. W. McNee, D.S.O., D.Sc., M.D.Glas., F.R.C.P.Edin., F.R.C.P.Lond.* Edinburgh : E. & S. Livingstone, Ltd. 1946. Pp. xix + 923. Price 30s. net.

In the last few years with the introduction of the sulphonamide drugs and penicillin very great strides have been made in the therapy of many diseases. Other new and valuable drugs such as thiouracil for the control of thyrotoxicosis have also been discovered and in preventive medicine the insecticide D.D.T. has revolutionized our methods of attack on disease-transmitting insects such as the mosquito in malaria and the louse in epidemic typhus. With these advances in knowledge it is essential that we should keep well abreast of therapeutic progress.

The fourth edition of the "Textbook of Medical Treatment," by Dunlop, Davidson and McNee, which has just become available, gives a very well-balanced presentation of advances in therapeutics, at the same time not omitting certain of the older well established methods of treatment. Where necessary a description of both the new and the older methods of treatment are given. The volume is attractively produced and the print easy to read.

There are, as usual in any book, certain statements on therapy that probably will not receive universal approval; in connection with cerebro-spinal fever, insufflation of the nose and throat with one of the sulphonamides is recommended in place of oral therapy for clearing meningococcal carriers. The American results with three days' oral medication using sulphadiazine given in small doses showed that the carrier rate can be very rapidly reduced to almost nil by this method. In the treatment of kala azar with stilbamidine the danger of using anything but a freshly prepared solution is rightly emphasized, but the possibility of the occurrence some weeks after completion of treatment of paræsthesia and painful facial ticks, even when fresh solutions are used, is not mentioned.

This volume is excellent in every way and is recommended to anyone who wishes to have a book of reference on medical treatment by his side, where he can find not only the drugs recommended but an account of the general management of the patients who are under treatment.

RESEARCH IN MEDICINE AND OTHER ADDRESSES. Second Edition. By Sir Thomas Lewis, C.B.E., M.D., F.R.C.P. London : K. H. Lewis & Co., Ltd. 1946. Pp. x + 102. Price 5s. net.

The appearance of a second edition of this small volume containing addresses written by the late Sir Thomas Lewis between 1920 and 1944 is most welcome. It includes the Harveian Oration on "Clinical Science" delivered before the Royal College of Physicians of London in 1933 and also "Reflections upon Reform in Medical Education," first published in the *Lancet* in 1944.

Lewis firmly believed that while clinical research was vital to medical progress, human physiology and medicine should aid each other in advancing clinical science. No one would deny the great influence he has already exercised on medicine and medical teaching of this century. W. R. M. D.

SOME MINOR AILMENTS OF CHILDHOOD. BEING HINTS TO MOTHERS. By Beryl Twyman, M.B., B.S. Edinburgh : E. & S. Livingstone, Ltd. 1946. Pp. 32. Price 9d., post 3d.

This booklet is pleasingly written but its title is rather misleading as the majority of the ailments on which hints are given are psychological in origin and can scarcely be termed "minor," though there are some practical directions on such disorders as mumps and the common cold.

There seems to be some confusion in the writer's mind as to whether she is writing primarily on how to look after sick children or stressing the necessity for more intelligent care and unselfish affection on the part of mothers in general. It would appear that the last consideration is the one nearer her heart, from her preface at any rate.

MEDICAL RESEARCH COUNCIL. WAR MEMORANDUM No. 10. THE MEDICAL USE OF SULPHONAMIDES. Second Edition. By Various Authors. Edited by F. Hawking and F. H. K. Green. London : His Majesty's Stationery Office. 1945. Pp. 71. Price 1s. 3d. net.

The first edition of this excellent handbook, which is the combined work of many eminent authorities, was published in 1943. Modifications and additions have become necessary as the result of recent advances in knowledge and experience of the sulphonamide drugs, the introduction of new compounds, and the influence of penicillin upon the treatment of many infections. Every aspect of the subject is dealt with in an orderly way, and although they are brief all the sections are well written and easily readable. The treatment of specific infections takes up the longest section, and other conditions in which the value of the sulphonamides is controversial are noted briefly. Harmful effects and their prevention and treatment are described in detail. The relation of the sulphonamides to penicillin therapy is discussed in one section. The advantages gained by following the sulphonamide content of the blood in severe cases when facilities exist are emphasized again, and laboratory procedures for the estimation or detection of sulphonamides in body fluids are described in one of the appendices. The editors are to be congratulated on a first-class publication of great practical value.

A PRACTICAL HANDBOOK OF MIDWIFERY AND GYNÆCOLOGY. Third Edition.

By W. F. T. Haultain, *O.B.E., M.C., B.A., M.B., F.R.C.O.G.* and Clifford Kennedy, *M.B., Ch.B., F.R.C.O.G.* Edinburgh: E. & S. Livingstone, Ltd. Pp. x + 388. Price 20s. net.

The book is well proportioned, and the subject presented in an easily read manner. New chapters have been added rounding off the theoretical scope of the work, though the value to the student is very small.

Many of the methods described are out of place in a practical handbook; they belong to a history of obstetrics. It is disappointing to find a chapter devoted to "asphyxia neonatorum" and the treatment of the pallida and livida varieties; disappointing too to find such a misleading statement on low spinal; for whatever one's own personal opinion may be as to its uses and dangers one desideratum must surely be the absence of mechanical difficulties.

LEWIS'S 1844-1944. A brief account of a century's work. London: H. K.

Lewis & Co., Ltd. 1945. Pp. viii + 89.

We have received a copy of the above booklet which records the remarkable growth of Lewis & Co., the well known medical publishing firm, from a very modest beginning to its present eminence.

The work—which is free on application—is beautifully printed, well bound in cloth and contains 90 illustrations, many of prominent personalities, medical and lay, concerned in some connection with the expansion of the firm over the last century.

THE EARLY DIAGNOSIS OF THE ACUTE ABDOMEN. Ninth Edition. By Zachary

Cope, *B.A., M.D., M.S., F.R.C.S.* London: Oxford University Press, 1946. Pp. xv + 262. Price 12s. 6d.

This little book has had a wide and deserved popularity since its first appearance twenty-five years ago and, while this ninth edition is distinguished by a few minor additions and alterations, the book is substantially unchanged and will continue to be of the greatest assistance to all in evaluating the early symptoms of acute abdominal disease. D. C. B.

THE DIAGNOSIS OF NERVOUS DISEASES. Ninth edition. By Sir James

Purves-Stewart, *K.C.M.G., C.B., M.D., F.R.C.P.* London: Edward Arnold & Co. 1945. Pp. viii + 880. Price 40s. net.

The ninth edition of Sir James Purves-Stewart's "Diagnosis of Nervous Diseases" is a very excellent production. The paper is good, the type large and easy to read, and it contains many useful illustrations.

To most of us this book is very well known, the present edition, however, is very much larger than the original edition which appeared away back in 1906. Since then there have been many additions to our knowledge of neurology and these have had to be incorporated. This has of necessity caused a considerable increase in the size of the book, which makes it more a volume of reference than an ordinary textbook of neurological diseases. As such it can be confidently recommended for a wealth of information has been brought together in this one volume.

NOTABLE NAMES IN MEDICINE AND SURGERY. Second Edition. By Hamilton Bailey, F.R.C.S., and W. J. Bishop, F.I.A. London : H. K. Lewis & Co., Ltd. 1946. Pp. viii + 202. Price 15s. net.

The first edition of this volume which appeared in 1944 was so much appreciated that it was exhausted in a few months. The object of the book was to give a short account of the owner of the names which have become familiar in the medical world.

This is a most interesting volume giving in a few pages the important facts in the life-history of these famous men.

The second edition contains no extensive alterations, but certain additions and improvements have been made especially in the illustrations.

A SHORT PRACTICE OF SURGERY. Seventh Edition. By Hamilton Bailey, F.R.C.S., and R. J. McNeill Love, M.S., F.R.C.S. London : H. K. Lewis & Co., Ltd. 1946. Pp. viii + 1098. Price 40s. net.

The seventh edition of this well-known book is larger by some 64 pages than its predecessor, and the authors, pursuing their objective of lightening and so shortening the text, have replaced some of the former figures, and have added 141 new illustrations, many of them coloured. The reproduction of the illustrations in this volume seems to us to have surpassed the high standard previously attained.

Much of the text has been re-written and re-arranged, to bring the teaching into line with current practice, and the book remains of a handy size.

The varying types employed relieve the text and lend emphasis where necessary, and with the beautiful illustrations combine to make this a book which anyone seeing will wish to possess. The authors and publishers are to be congratulated.

D. C. B.

A MANUAL OF TUBERCULOSIS. CLINICAL AND ADMINISTRATIVE. Third Edition. Largely Rewritten. By E. Ashworth Underwood, M.A., B.Sc., M.D., D.P.H. Edinburgh : E. & S. Livingstone, Ltd. 1945. Pp. 524, illustrated. Price 15s. 0d.

This book started life in 1931 as a Manual of Tuberculosis for Nurses. It is now double the original size and the title has been modified as shown above. This edition includes six totally new chapters on Evolution of Pulmonary Tuberculosis ; Allergy and Immunity ; X-rays ; Mental Aspects ; Social Medicine ; and finally, Tuberculosis and War. Amendments have been made to one or two other chapters. In spite of all this, the text cannot be said to justify its new title. Bronchial tuberculosis is not mentioned and pneumoperitoneum receives only four sentences. It is, however, a thoroughly reliable guide for nurses and laymen connected with tuberculosis schemes, and a sound introduction for students.

The X-ray reproductions are unusually excellent.

TUBERCULOSIS. Vol. I. DIAGNOSIS. Pp. 94. Vol. II. TREATMENT. Pp. 190.

Articles reprinted from the American literature, 1940-45, by the United States Office of War Information. No price given.

This collection of twenty-five articles is reprinted without any explanation of their corporate purpose. The high standard reached by many of the articles is not sustained throughout.

Diagnosis.—The subject is introduced by an excellent epidemiological review from the Surgeon General, U.S. Public Health Service. He refers to the value of Mass Miniature Radiography (M.M.R.) among industrial workers and their families. Of three-quarters of a million persons examined, 1·3 per cent, nearly ten thousand cases showed evidence of reinfection tuberculosis. 31 per cent of these were “moderately advanced” and 7 per cent were “far advanced.” The author estimates that nation-wide M.M.R. would approximately double the one and a half million already known cases of pulmonary tuberculosis in the U.S. He concludes with a masterly, if idealistic, outline for an effective tuberculosis programme, and makes the first of his eight essentials: “X-ray examination of the entire population.” It was said of a Chinese sage, “Thundering is the silence of Vimalakirti.” Mass radiography it seems is now saying the same of pulmonary tuberculosis, and compelling us to seek its solution on no less than a national scale.

The next three articles discuss the technique of M.M.R. and U.S. Army experiences of its value. The use of M.M.R. at induction centres picked out 0·15 per cent of men as having “significant infiltrates.” This is rather lower than figures given by our own Services.

A section of four articles deals with the diagnosis of minimal pulmonary tuberculosis. One of these articles shows how arbitrary is the distinction between “open” and “closed” cases. Only minimal cases of active disease are under consideration. A period during which sputum only was examined, by smear and guinea-pig inoculation, is compared with one in which gastric contents were withdrawn as well, and examined by culture and inoculation. By adding resting juice examination to sputum examination, the percentage of T.B. positives was raised from 33 per cent to 97 per cent in “sputum” cases, and from 0 per cent to 80 per cent in “no sputum” cases. The authors fail, however, to indicate how many examinations were made to achieve this striking result.

Vol. I concludes with a long and excellent, though rather irrelevant, article on Bronchial Carcinoma.

Treatment.—The second volume is divided into three sections: Collapse Therapy; Surgery; and Experimental Therapy.

The best of the seven articles on collapse therapy gives a “non-statistical analysis” of the factors involved in proper management of an artificial pneumothorax. The author sets out clearly the principles which underly the selection of cases for A.P. and the use of pneumolysis in improving an A.P.; he also stresses the necessity for abandoning every ineffective A.P. Most of the other articles on collapse therapy are statistical analyses of cases so treated. The task of extracting the lessons from these numerous tables of figures is laborious, and the details of one series after another are confusing. The results

which emerge however are largely what one would expect, namely that collapse therapy is better than bed rest alone, but that a bad collapse is worse than none at all.

The four surgical articles discuss the indications for and results of lobectomy and pneumonectomy in pulmonary tuberculosis. The most significant series is one of 60 cases in which 24 had lobectomy and 36 had pneumonectomy. Though the total operative mortality was 11 per cent, most of this was due to the high mortality (38 per cent) in a small series of thirteen "desperate risk" patients, who were considered to have no possible chance of recovery by any other treatment. The only frequent complication was contralateral spread, and this occurred in 12 per cent. Of those patients who were classified as "reasonable risks," 66 per cent are clinically well with negative sputum, though the period of observation on which this figure is based is too short for it to be final. Some differences of opinion over the indications for pulmonary resection is displayed by the various authorities; failure of thoracoplasty, tuberculous bronchitis and basal tuberculosis seem to be those most generally agreed on.

One turns hopefully to the section on Experimental Therapy, but is met by a very guarded optimism. Promising results of the sulfones in guinea-pig tuberculosis have not been confirmed in man. The assessment of any new treatment for so unpredictable a disease is beset with dangers, and conditions for the scrupulous comparison of treated and control series are suggested.

The final article discusses the problem of the tuberculous ex-Serviceman and draws attention to the mistakes made in providing for him after the first World War.

The reproductions of X-rays are numerous but of rather poor quality.

CHEMICAL COMPOSITION OF FOODS. Second Edition. By R. A. McCance, M.D., Ph.D., F.R.C.P., and E. M. Widdowson, B.Sc., Ph.D. Medical Research Council Special Report Series No. 235. London: H.M. Stationery Office. 1946. Pp. 156. Price 6s. net.

The new edition of the *Chemical Composition of Foods* by McCance and Widdowson has been greatly enlarged and revised.

It consists of two sections of very comprehensive tables of analysis. The first Table is shown as per 100 grammes, and the second as per ounce. The two sections do not both contain the same items although the most common foodstuffs are present in each.

The main advantage of these tables is that they cover the analyses of both raw and cooked foods. The recipes for many of the made-up dishes are also given, which will enable anyone using the tables to be sure of having the correct figures for cooked dishes instead of, as is usually the case, having to take average or approximate figures.

The only nutrients of any importance which are not given are the vitamins. This will be a disadvantage to those carrying out surveys where the vitamin content is also required. This fact does not, however, take away from the excellence of the book, which is recommended to anyone who has to analyse diets of all types.

A. G. J.

Notices.

KING EDWARD VII CONVALESCENT HOME FOR OFFICERS, OSBORNE, ISLE OF WIGHT.

Telegrams : "Convalescent, Cowes." Telephone : Cowes 251.

(1) Osborne House, East Cowes, Isle of Wight, formerly the home of Queen Victoria, was given by King Edward VII to the nation on his Coronation, and has since served as a Convalescent Home for Male Officers, serving and retired, of the three Fighting Services and Male Established Officers of the Indian, Colonial and Home Civil Services, under the management of the Commissioners (now Ministry of Works). In this the Ministry are advised by a House Committee consisting of Senior members of the Civil Service, the Permanent Secretaries of State for War and Air and the Naval Secretary to the First Lord and the Medical Directors of the Admiralty, War Office and Air Ministry. There is also a Consulting Staff of which a number of leading Specialists actively associated with the larger London Hospitals are members.

(2) The house is situated on the Solent in an exceptionally beautiful park of 350 acres, which contains a private golf links and bathing beach. Walks in the private woods adjoining the Estate along the coast are also available for the patients.

(3) There is a Resident Medical Superintendent. A fully qualified nursing staff and physiotherapist are employed. Medical attendance, including the advice of the visiting consultants, is free, but a small charge (usually 6d. *per diem*) is made for special treatment such as massage, diathermy, ionization, radiant heat, ultra-violet rays and other electro-therapeutical treatment. In the case of serving officers and ex-officers sent by the Ministry of Pensions, this charge is remitted. There is also a Remedial Gymnast-instructor who supervises the remedial exercises and games, individually and in classes. Osborne House now possesses all facilities and amenities for the rehabilitation of officers recovering from medical and surgical conditions.

(4) There is accommodation for 50 patients, and bed cases can be accepted. The bedrooms are large and airy, many having beautiful views over the Solent, and only when the house is full to capacity is it necessary for more than one officer to occupy a single room. There is a Hostel in the grounds where the wives and families (except very young children) of patients can be accommodated at a charge of from £5 5s. per week. The wives and families of officers are permitted to take part in all the social amenities of the Home, and a comfortable sitting room is provided in the House for their use.

(5) In addition to the golf links and bathing beach, there are hard and grass tennis courts, a croquet lawn and a bowling green for use during the summer months. There is also a recreation hall where dances and theatricals take place and where cinema films are shown during winter months. There is also a library, billiards table, etc.

(6) Patients are met on arrival at Cowes or Wootton Station by one of the House cars, which are also available for their use on leaving and may be hired for a small charge for necessary visits within the Island. Garage accommodation is available for patients bringing their own cars.

(7) In cases of serving officers and ex-officers sent by the Ministry of Pensions, there will be no charge. The scale of charges payable in other cases is as follows :—

Retired or ex-officers not sent by the Ministry, 6s. per day.

Officers of the Civil Services, 10s. per day.

Officers on half-pay, 4s. 6d. per day.

(8) Serving officers travel at Government expense.

(9) Arrangements for admission may be made direct with the House Governor.

3 BR. INF. DIV. OFFICERS' ASSOCIATION.

A 3RD British Infantry Divisional Officers' Association has been formed, which is open to all Officers who served in the Division between September, 1939, and VJ Day, 1945.

(1) The Life Membership and Registration Fee is 10s.

(2) The above sum, together with the Proposer's name and address, should be sent to The Hon. Treasurer, 3rd British Infantry Divisional Officers' Association, 3, Lincolns Inn Fields, London, W.C.2.

In return for this sum the Member will receive, periodically, News Sheets giving any permissible news as to the activities of the Division ; a list of Members' addresses will be circularized from time to time and the Member will also be advised of the date of the Annual Dinner, the first of which function is to take place in London on September 28, 1946. Tickets for this year's Dinner, costing £1, can be obtained upon application to The Hon. Secretary, at the above address.

It is hoped, in time, to increase the activities of the Association but this will take some time to organize and depends to a large extent on the number of members.

NORTH PERSIAN FORCES MEMORIAL.

WE have been asked by the War Office to announce that the North Persian Forces Memorial Medal will be awarded again next year after a lapse of nine years due to the War. This Memorial was founded in 1923 by officers of the Royal Army Medical Corps and Indian Medical Service who served with the North Persian Forces during the Great War. They wished to commemorate the services of the North Persian Forces and to encourage the study of Tropical Medicine and Tropical Hygiene.

The Memorial takes the form of a silver medal and is awarded annually for the best paper by a single author on tropical medicine or tropical hygiene published in any journal during the twelve months ending December 31, by any medical officer of under twelve years' service in the Royal Navy,¹ Royal Army Medical Corps,¹ Royal Air Force,¹ Indian Medical Service or the Colonial Medical Service.

The award is announced in the latter part of the year following that in which the paper was published, provided that the Memorial Committee consider the paper to have attained the standard of merit justifying the award.

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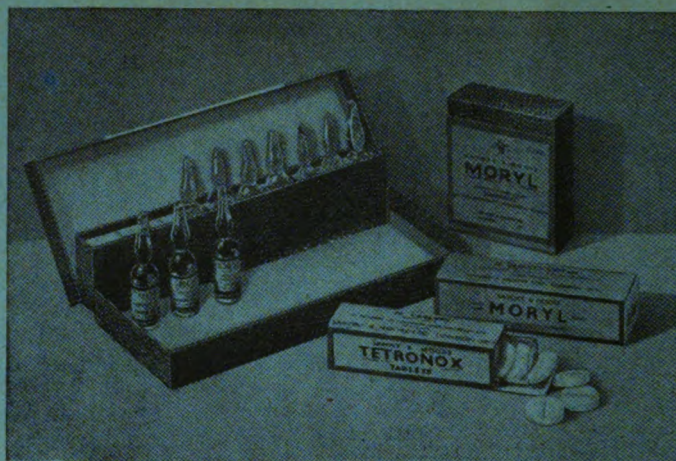


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Original Communications.

**THE FUNCTION AND FUNCTIONING OF A SURGEON
IN GUERRILLA WARFARE**

BY

GEOFFREY PARKER, M.D., F.R.C.S.,
D.S.O., Croix de guerre, Chevalier de la légion d'Honneur

[Received September 16, 1946.]

I WOULD like to start this short article by asking, and trying to answer, the first question which naturally presents itself. In what way does this sort of medical work resemble, and in what way does it differ from, that of the Medical Services of a Regular Army?

The function of the Medical Services in both cases is the care and maintenance of the major sick and wounded and the rapid repair of the minor cases, so that they may rejoin their Units, properly reconditioned, as soon as possible.

Having said this, the differences in the two Services of Regular and Guerilla warfare must be emphasized and this will involve me in a short discursion on the subject of "total war."

This is a term often loosely applied by those who, far from a theatre of war, have yet suffered from the vagaries of indiscriminate bombing or the chance tragedies resulting from a fighter-harassed bomber jettisoning its load while on its way to a military objective. This may be "war on the home front" but it is not "total war." Civil and guerilla warfare alone constitute "total war," with all its hideous implications.

Here there are no "rules" except those of the jungle. Torture and death is the fate of all prisoners, wounded or unwounded. Enslavement, torture and death is the rule, too, for the family of any man or woman who dares to lift a hand against an occupying army. The wives and sisters are sent to the soldiers' brothels, and the children and old people to the labour and concentration camps, from which only a small percentage will return with their minds and bodies permanently damaged to a greater or lesser extent.

Guerilla fighting, therefore, attains a degree of bitterness which is unknown in classical warfare, except during those rare moments of hand-to-hand fighting.

The next points of difference are in the matter of the composition of a guerilla force, its morale and its discipline.

The ætiology of such a force varies in each component individual. Simple unquestioning national patriotism, political hatred of the enemy's way of life, a desire for vengeance for atrocities committed on loved ones, and, rarest of all (and the least reliable source of inspiration), a spirit of pure adventure. Each and all operate in individual members of such a force. Each fights by reason of his or her convictions or from necessity. However the ætiology may differ the mass effect is the same : a force which is quite unconquerable so long as it lives, not only collectively but as individual men and women. The high morale of these people is something which has to be lived with to be appreciated.

So long as there is work to be done and enemies to be killed, the tireless and irrepressible courage of these ragged patriots made me think many times of Tolstoi's axiom that wars are won, not by preponderance of guns, nor even by brilliant generalship, but by the fighting spirit of the soldiers engaged.

Lastly, the question of discipline and its maintenance, a factor with which morale is intimately linked.

There are no A.C.I.s or Part I and II Orders in a guerilla force. Orders are given, for the most part, by word of mouth. There can be, therefore, no fine grades of obstruction to, or evasion of, orders received. Either an order is obeyed or it is defied, and so, accordingly, "field punishment" is reduced to its simplest and grimmest forms. Immediate execution was sometimes threatened, though rarely resorted to, except for acts of cowardice or treachery. Dismissal from the force was sometimes ordered, and this might well mean an indirect death sentence since the dismissed man could no longer rely on the protection of numbers of his compatriots about him, and stood a good chance of being picked up by the enemy who would still treat him as a guerilla. He was left to survive, if he could, in a land where the hands of foes and former friends alike were turned against him.

In a preceding paragraph I have described the secret of maintenance of discipline, as I saw it practised by our own "Chief" in France, Colonel Roman, *D.S.O.*, a Frenchman of prodigious energy and fantastic personal courage of which I was a privileged witness on more than one occasion. He rarely gave us, or the enemy, a day's nor yet an hour's peace.

An active guerilla force is well disciplined, but a period of idleness is even more disastrous to it than it is for a regular force. The keen men are bored and frustrated, and so drift away to more active units in other parts of the country ; while the poorer types, whose motives for being in the irregular force are often mixed ones, will swagger round in idleness, recounting their past deeds of valour, drinking too much, and displaying their arms, more for the appreciation of the local women than the destruction of the enemy. Such a

force, when again put suddenly to the test of battle, will disintegrate completely in a matter of hours.

Our Chief's policy was therefore one of perpetual movement, and often in this intention it must be said he was assisted by the attentions of the German occupying forces. As soon, however, as the attacks slackened off, acts of sabotage and assaults on the enemy lines of communication were at once organized, and so a busy time was had by all, and little opportunity for the demoralization of idleness. The morale of the men, therefore, was kept constantly at a very high pitch. The Maquis were completely irrepressible, and it was a perpetual tonic to be with them. No opportunity for making jokes of their own misfortunes was allowed to pass. At times this effervescence bordered on the hysterical, but this was only at particularly desperate moments, and for the most part it was entirely spontaneous and genuine. A remarkable phenomenon in a group of men and women who fought without hope of mercy if captured, and who knew that the very fact that they were there at all was an automatic death sentence, not only for themselves but also for their families, if they were identified.

I must apologize for this preamble, but it has a direct bearing on the work of a surgeon who finds himself engaged with a guerilla force. In the first place, he must try always to be on the spot where the actual fighting is taking place, and this may well be difficult when unexpected contacts with the enemy occur in widely separated areas.

The effect on the morale of these irregular fighters of the presence of a few men or women with even the elements of medical training is entirely out of proportion to the actual medical services that they may be able to render to the sick and wounded. This is fortunate because, generally speaking, the medical services can only be of the simplest kind, and might be classed as "high grade first aid." Of course, the fighting men know this, nevertheless it is just one more small barrier between them and death, and it means much.

In the second place, there is no such thing as "evacuation of the wounded" in a guerilla army. The medical man must be prepared to carry his cases about with him, or hide them securely in the forest country, if any, or in the cellars of remote farms, where loyalty to the Cause is unquestioned. Even in these "hideyholes" he must continue to feed, water, and treat his cases, as no one else not actually involved with the guerillas will dare to do so for fear of reprisals on themselves and their defenceless families.

In the third place, the medical man must be prepared to fight in defence of his wounded and of himself. He does not wear a uniform, and he must carry arms and use them. He is, therefore, violating international law (whatever that may mean), and he and his patients will die together if they have the misfortune to be captured. This is not the place for discussion or comment on the ethics of all this; but the above are facts which must be taken into consideration if this type of medical work is to be well done.

I seem to have wandered again from the main purpose of this article, but I have tried in a few words to give a picture of the "material" on which

the guerilla surgeon will find himself at work, and I will come now to a more detailed study of purely medical considerations.

The first questions that a doctor must ask himself when setting out for this type of warfare are, "What shall I take with me?" and "What shall I find to use when I get there?" The answer to the first question is "Nobody knows better than he does, even if nobody knows less," and to the second "Nobody knows at all."

In dealing with these questions myself, therefore, I made the following plans. I divided my medical equipment into two groups: the first consisted of the maximum of bare essentials that, at a pinch, I could carry on my own back in a highly mobile war "on the run," and the second consisted of the maximum that they would allow me to take in the 'plane which was to carry me to my destination.

The load to be carried in a rucksack on the back consisted of:—

- (1) One canvas surgeon's roll (American pattern). A superbly well-thought-out set containing about 40 stainless-steel instruments (including a small ophthalmic set) with which it was possible to do any major or minor surgical operation that might be encountered in war.
- (2) Metal spools carrying 100 feet of linen thread and silk for ligatures.
- (3) 200 one-gramme ampoules of pentothal sodium.
- (4) 200 compressed shell dressings (regulation pattern).
- (5) 100 grains of morphine sulphate in $\frac{1}{4}$ -grain tablets.
- (6) 2 lb. of sulphanilamide tablets (to be crushed up for local application) in two light metal containers.
- (7) 50 packets of compressed wool (to be used as "sterile" swabs) for operating.
- (8) One 10 c.c. all-metal syringe and needles.
- (9) One spare shirt and two pairs of socks and mending material.

In addition a .45 Colt and 50 rounds, and a dagger (commando pattern) were carried, and to this was added a small automatic rifle and 200 rounds on arrival in France.

I had no time to do a trial loading before leaving England, and when it came to the point of actually carrying this, I found myself defeated by the bulk rather than the weight, and had to part with 100 ampoules of pentothal, 100 shell dressings and one pound of the sulpha tablets. Another man took charge of these for me, and in the confusion of a sudden retreat into the forest I lost sight of him and the stores for many weeks, but both turned up safely later on.

The "bulk" packing to be carried in the 'plane was limited in weight, as many other things such as explosives, ammunition, chocolate, cigarettes, etc., had to be taken and either dropped by parachute or landed with us. I limited myself, therefore, to half a dozen Thomas' splints (paratroop collapsible pattern), 500 lb. of Cellona plaster bandages, 10 metal bottles of chloroform (ether was not permitted in the 'plane, for obvious reasons), 50 lb. of carbolic soap, and 20 "first-aid sets." These latter were not "combat" packed, i.e.

as separate units ; some contained only instruments, others only drugs or dressings, etc., and they all had to be hastily unpacked and reassembled on arrival. When this was done, each set contained :—

- (1) Three pairs of artery forceps.
- (2) One knife and one pair of dissecting scissors.
- (3) 6 first field dressings.
- (4) 6 packets of compressed wool.
- (5) 2 ampoules of pentothal.
- (6) 10 grains of morphia in $\frac{1}{4}$ -grain tablets.
- (7) Some sets had a metal syringe (5 c.c.).

Tourniquets were supplied with the sets, but I did not issue them as I think that they are a source of great danger in the hands of the semi-trained. These first-aid sets were for distribution to any medical students, doctors and nurses whom I hoped to have to work with me, and they proved of the greatest value in the later stages of my time in France.

It was my intention to distribute these sets, together with extra first field dressings, and plaster bandages, to the young medical students and nurses who were working with the Maquis, to be taken when they were operating with small groups of from five to twenty men carrying out isolated acts of sabotage, etc.

In actual practice nearly the whole of my " bulk stores," such as they were, were overrun by the Germans within four days of my arrival, though most of it was safely hidden and recovered later.

The area where I was working was heavily attacked by two and a half German Divisions including some armoured car units and two battalions of SS, so the Maquis broke up into small groups, and we ran for our lives into the forest, taking about eighty wounded with us. Nine of our wounded I failed to extract from a hospital before the Germans arrived ; they were caught and executed under particularly brutal circumstances by the Wehrmacht.

As soon as possible, that is about nine days after this dispersal in the forest, code messages were sent to England for further medical supplies, together with antiscorbutic tablets (as I found a number of the younger Maquis suffering from minor degrees of scurvy). In due course these supplies, together with a number of other things, were dropped to us by parachute in the night in the mountains.

At this stage in the fighting, we only took with us such wounded as were incapable of doing anything for themselves but were at the same time fairly mobile. The rest we hid in little groups of two or three, either in the denser parts of the forest or in remote farmhouses. The latter was the more dangerous method, as there was the perpetual and very real risk of informers and a search by German troops, when, if the Maquisards were found, or indeed, any trace that they had ever been there, the farmer and his family would be executed and the farm itself razed to the ground.

The care of these widely separated groups of wounded was particularly difficult, and the half-dozen doctors, students, nurses and I must, between us,

have crept many hundreds of miles along the forest tracks at night to visit them every three or four days.

The surgical treatment of these cases might be described as an oversimplified form of the Trueta principle as he first described it during the Spanish civil war. All wounds were laid widely open and, when in doubt about an amputation, then an amputation was done. Possible late complications had to be cut down to a minimum, and neither immediate closure nor secondary suture was ever considered safe and practical owing to the difficulties of post-operative supervision. The sulpha drugs could be applied locally and given by mouth for a few days.

Plaster of Paris bandages were in very short supply, and I could only use them where there was a fracture complicating the wound. For strengthening, and also for economy in plaster, pieces of wood or small branches of trees were incorporated in the plasters and, in cases where the plaster casing might be easily visible, such as, for example, a light thoracobrachial plaster, the surface of the casing was rubbed over with earth and leaves to camouflage the man when moving through the woods in daylight.

I found among the cases already wounded before I joined the Maquis, three cases of dropfoot. Two were GSW of the sciatic and external popliteal nerve respectively, while the third was a GSW of the thigh with a fractured femur in a man who had lain hidden and untreated in the woods for about ten days. All three cases had been hit many weeks before I arrived, and their wounds were soundly, though untidily, healed, and there was early union in the fractured femur (middle third) in almost perfect position. The cases presented a problem, however, because they could not walk and had to be supported or carried round wherever we went.

With the aid of an ordinary dog collar round the leg above the knee, connected to a wire loop through the toecap of the boot by a piece of parachute cord and a rubber tourniquet, the footdrops were corrected, and within a week the two nerve injury cases were walking round unaided. One of them at once hobbled away to his unit to go on with the fighting.

The two other cases, together with a number of other badly wounded cases, we took by night to the Swiss frontier, when the journey across country was fairly free of German troops. The Swiss Red Cross authorities very kindly took them off to a hospital in Geneva. Their safe arrival on neutral territory relieved me of a headache of many weeks' duration.

Abdominal wounds, in this type of warfare, carry with them an almost 100 per cent death-rate, owing to the impossibility of operating under anything like proper surgical conditions. I was fortunate in having only one case of this sort due to enemy action; a man with two Spandau bullets through the left iliac fossa and the gluteal region and rectum. This man we managed to sneak down into the nearest town at night, where I operated on him in the local hospital which the Maquis "took over" under the noses of the Germans for the hour and a half required to get him to the hospital and into the theatre, to repair some small bowel perforations, do a colostomy, and open up the rectal wound. The man made a good recovery and was looked after by the

Nuns at considerable risk to themselves until, about two weeks later, we again came down into the town and took him safely away to Switzerland.

I saw one other abdominal wound, due to an accident with a Sten gun, and I had the distressing experience of watching him die from intra-abdominal hæmorrhage. At this time we were hidden in a granary many miles up in the mountains, and there was no possibility of getting him to proper surgical surroundings in time.

To turn briefly now to other sides of the work. For the period that I was in the Maquis we were very fortunate with the weather. Glorious sunshine for most of the time, though of course we had to keep to the darker parts of the forest during the day to avoid being spotted by the reconnaissance 'planes which were constantly about. It often rained at night and, lying on beds made of branches, we got very cold and wet in the small hours of the morning; but usually we were up and moving by first light and so soon warmed up again. We had no cases of pneumonia, nor were there any complaints of the many minor afflictions of soldiers, during the periods of great activity. As soon as things got slack, everyone complained of everything, from colds in the nose to sore feet; but there were very few periods of inactivity.

A few words about hygiene in guerilla warfare. In my short experience, every principle and rule known to the Army Manual on the subject was violated. During a period of severe privation, we killed and ate a goat and a few rabbits. Their carcasses were hung from the branches of trees, and during the night men got up to pass fæces within five yards of where the carcasses were hanging. As soon as the day warmed up, therefore, myriads of flies buzzed frantically backwards and forwards between these two heaven-sent and unexpected meals. This was not an isolated instance; similar conditions were repeated many times. There were a few cases of diarrhœa, but none of clinical dysentery. I attribute this to the fact that we never stayed on one spot for very long at a time; at the most, two or three days. Being "on the run" has little to commend it as a way of living, but it has its compensations for the harassed M.O.

Everybody was lousy and flea-ridden, and we could do nothing about it. We had a small quantity of soap with us, but for a period of nearly three weeks the Germans cut us off from our water supplies by putting heavy machine-gun posts to guard the wells, and during this most distressing period each man had less than half a litre of water or diluted wine per day. Every drop of this was needed for drinking, as climbing about in the mountains in the hot July weather, with a large rucksack on the back and weapons to carry, caused much sweating, dehydration and misery. We were reduced to trying to augment the daily half-litre by wiping the dew from the surface of the bracken with a rag and then sucking the rag. It took all the courage and example of Colonel Roman to keep up the men's morale at this time, and I think that I will remember it all my life.

This dehydration had a further distressing effect. Everyone became extremely constipated, and one or two of the older men were threatened with fæcal impaction and obstruction. A number of the men came to me demanding aperients. A few drastic purgatives only were available at this time, but I did

not issue them, as I feared that further dehydration would make the men too weak to climb with their weapons and big packs on their backs. We all suffered much from colic and rectal tenesmus from the hard faecal masses, but this seemed to me to be the lesser of two evils, the second being to fall exhausted into the hands of a German patrol. When eventually, by a "coup de main," we got hold of some butter we ate it like wolves, and in a matter of a few hours all was well again.

REFLECTIONS.

It is to be hoped that any reflections on war experiences of all kinds will only be in the nature of academic exercises, having no future applied value other than as historical records; but, the world being what it is to-day, and a number of people being apparently quite prepared to resort to the old methods of settling arguments without solving problems, it may perhaps not be entirely profitless to consider the best ways in which a surgeon might prepare himself for at least a few of the unpredictable eventualities of guerilla war.

Personal preparation should clearly consist in being extremely fit. "Toughness" is not a virtue, but here it is a necessity. Under famine conditions a fat man gets ill before a thin one, from acidosis due to rapid breakdown of his own fats, unsupported by the normal protein and carbohydrate intake. A thin man, on the other hand, too easily tires. Mentally, the M.O. must prepare himself for a life where nothing ever happens "according to plan" and where the extreme limits of improvisation will be required of him. He must also be prepared not only to "bear arms" but he should be skilled in their use, so that he may give a good account of himself should the necessity arise. Incidentally, he will get no respect or support from the fighting man unless he shows himself ready to play his part in this respect if called upon to do so.

So far as personal equipment is concerned, this must be of the smallest and most compact. Apart from the clothes he stands up in, the M.O. should take an extra woollen shirt, two handkerchiefs, and a pair of leather gloves: this should be enough for three months. Socks are unnecessary; they soon ruck up with heavy climbing and, in any case, wear out too quickly. If the feet are in good condition and the boots a perfect fit and well greased, all will be well. I did not wear socks at all while in France, and often did not take off my heavy boots for many days and nights, as the danger of sudden attacks and the need to "get off the mark" quickly was always with us, and I had no foot trouble the whole time.

Anti-louse powder is more important than soap if there is a water shortage, though both should, of course, be carried. Soap, however, is bulky and heavy. A very light, quilted sleeping bag—alpine pattern—is a great comfort, but it should be so cut that it can be quickly shed if necessary.

Medical supplies should be of a kind which are unlikely to be found on the spot. Sterilizing apparatus is out of the question: neither the sterilizer nor the fuel for it will last very long, and any farmhouse can produce enough boiling water for the type of surgery which will be done with a guerilla force. Swabs can be used and washed and boiled up over and over again if they have

been well sewn up round the edges. Catgut is too bulky in practical quantities, and silk or linen thread spools can be re-sterilized repeatedly. Pentothal is probably the most portable and practical anæsthetic, particularly as the type of emergency operation to be done rarely takes longer than twenty minutes. Morphia in tablets is less bulky than ampoules, and 5 c.c. and 10 c.c. all-metal syringes are essential.

Prescience of the local conditions, as well as individual preferences, will naturally suggest modifications both in the personal and "bulk" packing.

I think that any man—and there are a number—who had experience of this sort of warfare, will agree with me that, apart from the extraordinary medical experiences, a surgeon will come out of it the better for having lived awhile with men and women who live and fight for their ideals, unmoved by political clichés and propaganda.

DERMATITIS CAUSED BY SHIRTS IN B.L.A.

BY

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IN the months of August and September, 1944, there began to appear in the Normandy bridgehead a type of dermatosis more or less confined in the early stages to the shirt area; later becoming more generalized. This rash appeared to be peculiar to B.L.A., and during a year from September, 1944, to September, 1945, as many as 391 cases were seen by one of us (G. A. H.). The following figures show the quarterly incidence of cases in relation to the total number of dermatological cases admitted to hospital in B.L.A. :—

		Total admissions	" Shirt " cases	Per cent
1944 Oct. - Dec.	.. ..	2,592	127	4.5
1945 Jan. - Mar.	.. ..	4,053	279	6.9
1945 Apr. - June	.. ..	3,487	326	9.5

Towards the latter part of the time a large proportion of shirt cases were not admitted to hospital, but were provided with cotton underwear and allowed to carry on at their own units. All cases occurred in male other ranks (with the exception of one officer), aged 19-43, with even distribution throughout this age period.

TYPE OF ERUPTION.

The eruption was always typical, and all or some of four elements might be seen in each case—shiny papules, areas of erythroderma, purpura, and scaly pityriasis-rosea-like plaques. The onset was often without itching, and might be discovered by chance by the patient. The extent of the rash usually corresponded to those parts of the body covered by the shirt, the first areas to be affected being commonly on the arms or in the region of the buttocks. The face and the neck above collar line, the palms of the hands, and the soles of the feet were always spared.

The fully developed case showed shiny, non-follicular, reddish papules on the forearms, arms, axillary folds, abdomen, trunk, upper thighs, and dorsum of the penis; scattered pityriasis-rosea-like "médaillons," and areas of erythroderma with scaling on the backs of the shoulders, over the sacral triangle, and on the buttocks over the greater trochanters. Mingled with the rash would be fine petechiæ and linear purpuric streaks over the backs of the shoulders, axillary folds, sides of abdomen, trochanters and sacral region or along scratch marks.

After a varying time of days or weeks, widespread fine papules with purpura would appear over the lower legs, dorsum of the feet and toes, and,

particularly, behind the internal malleoli; these might continue to develop even though the patient was in bed in a white hospital shirt. A severe case might exhibit erythroderma with exfoliation over almost the entire trunk and limbs. Glandular enlargement in the groins occurred in severe cases. Scratching or friction produced local exudative dermatitis in a few cases.

Follow up of cases under Service conditions was difficult but many of the mild cases cleared up spontaneously at duty, others deteriorated and required hospitalization for a few weeks, and a further number were severely incapacitated over months and were invalided home. We have seen evidence of the condition still present after twelve months as pigmentation of the skin, and rough scaly areas with quadrillation over the backs of the shoulders, and in the region of the buttocks.

The rash first appeared, and was most marked, over prominences such as the sacrum, greater trochanters (here the rash would first appear on the side on which the man slept), the "vertebra prominens," hypertrophic scars of wounds or appendicectomies, etc. The localizing effect of friction was shown by the distinctness of the rash under the belt, braces, etc., and in one instance on the trunk as a result of being held firmly by a partner at a dance.

The incrimination of the shirt as a common factor was suggested by examination of the initial sites affected (Table I).

TABLE I.

<i>Site of initial lesion</i>	<i>Number of cases</i>	<i>Percentage of cases</i>
Arms	163	33
Shoulders	22	4
Abdomen and groins	46	9
Hips, sacrum, buttocks	159	32
Thighs	28	6
Legs	24	5
On more than one of the above..	58	12

500

The majority began on the arms or in the region of the buttocks; areas in intimate contact with the shirt, and only 5 per cent outside the shirt area.

We first considered whether the rash might be due to sensitivity to wool and a series of patients was asked if wool had previously irritated their skin. Among 340 "shirt" cases 95 (28 per cent) were intolerant as compared with 40 (31 per cent) in 123 controls.

A further test for wool sensitivity was made by letting 18 patients wear a woollen sock on one foot and a silk one on the other for periods varying from six to twenty days. The patients were in all stages of the eruption with the feet affected, but apart from one patient who said his foot was more irritable, though with no objective change, no difference was observed in the two sides, and the feet cleared normally. These findings showed that sensitivity to wool was not the cause of the eruption.

Assuming that the causal agent was intimately connected with the khaki shirt, we wondered whether it might have come from the washing process. Investigation of the methods by which the shirts had been washed during the

two month prior to the onset of the rash revealed that 49 per cent of men used the Army mobile laundries, 14 per cent civilians or civilian laundries, 15 per cent did their own washing and 22 per cent employed some combination of the above. We then carried out the series of patch tests shown in Table II. These included such soaps as might have been left in the shirt after inadequate rinsing, the high titre soap (alkaline) used by the mobile laundry ; D.D.T. was applied as a powder (AL63) and as the proprietary preparation used for the impregnation of the shirts by the mobile laundry. The vest and the blanket both served to test for sensitivity to wool, whilst the bichromate solution and the battle dress would demonstrate sensitivity to khaki dye.

TABLE II.—PATCH TESTS, SERIES NO. 1.

Test substance				Shirt cases				Controls			
				No. of cases	Percentage results			No. of cases	Percentage results		
					+	±	—		+	±	—
Shirt	..	..	..	161	0	1	99	52	0	0	100
Shirt + 2% issue soap	..	..	..	143	22	20	58	40	40	5	55
Shirt + 2% toilet soap	..	..	..	84	19	8	73	10	20	0	80
Shirt + high titre soap	..	..	..	15	20	27	53	13	62	23	15
Vest (1)	..	..	..	64	2	0	98				
Vest (2)	..	..	..	25	0	0	100				
Shirt + AL63 powder	..	..	..	145	6	4	90	68	0	0	100
Shirt + AL63 + 2% issue soap	..	..	..	70	36	21	43	40	13	20	67
Shirt + proprietary D.D.T.	..	..	..	15	0	7	93	13	0	8	92
Battle dress	..	..	..	35	0	6	94				
5% bichromate sol.	..	..	..	28	4	0	96				
Blanket	..	..	..	33	3	3	94				

The almost negative results with vests and blanket rule out wool sensitivity, and the same findings with battle dress and bichromate solution exclude khaki dye. The negative results with the shirt will be referred to later as will the D.D.T. findings. With the various types of soap there was no significant difference between the "shirt" cases and the controls.

To reproduce the effect of application more accurately than with a patch test, 18 patients wore gloves, one of which contained AL63 powder, for from seven to twenty-one days. No effect was observed in any patient. 20 patients wore a similarly treated sock with a silk one, powdered with talc, as a control. 4 only of these patients in answer to leading questions admitted irritation on the former side, but they knew which was the test sock ; there was nothing to see in one, slightly increased purpura in the second, and a few papules on the dorsum of the foot in the other two.

Towards the end of the investigation we noticed that a large proportion of the patients had been recently wearing a new shirt (commonly of American woollen type with collar attached) ; 45 per cent of the last 87 cases gave such a history. It was therefore thought that the negative patch tests of the first series might be due to testing with old washed samples of shirts from which the irritant factor had been removed.

A second series of patch tests was carried out using (1) a brand new khaki shirt, (2) the same new shirt after washing with "issue" soap, (3) the solution of dye and soap, etc. ("broth") left after laundering, (4) an old khaki shirt not recently washed by the Army laundry, and (5) the same old shirt after it had been boiled with the "broth" in an attempt to impregnate it. We considered that this latter mechanism might account for those cases who were not wearing a new shirt and yet who still developed the eruption.

In addition, as these new khaki shirts contained D.D.T., patch tests as in Table III were performed, including controls with emulsion base and issue soap.

TABLE III.—PATCH TESTS, SERIES NO. 2.

Testing substance	Shirt cases				Controls			
	No. of cases	Percentage	+	±	No. of cases	Percentage	+	±
(1) New unwashed shirt	39	36	15	49	10	0	0	100
(2) Washed new shirt	39	31	23	46	9	0	0	100
(3) "Broth"	38	—	10	90	11	9	9	82
(4) Old shirt	26	2	10	88	9	0	0	100
(5) Old shirt and "broth"	26	8	19	73	9	0	0	100
(6) AL63 powder	14	7	—	93	9	0	0	100
(7) AL63 5% in Lanette wax base	44	16	11	73	9	0	0	100
(8) Lanette wax base	34	3	6	91	9	0	0	100
(9) 2% "issue" soap	39	33	11	56	61	30	12	58

The new shirt thus gave 36 per cent positive, or including doubtful positives 51 per cent, and after one washing with issue soap, 31 per cent positive, and 54 per cent positive or doubtful positive. Similar figures for an old shirt were 2 per cent and 10 per cent, and when it had been boiled with "broth," 8 per cent and 27 per cent. Controls for all these in normal people were almost consistently negative.

The "broth" (i.e. dye, soap, D.D.T. and possibly other chemicals) showed no positives and only 10 per cent doubtful positives in "shirt" cases, as against 9 per cent and 18 per cent in the controls.

D.D.T. as AL63 powder produced 7 per cent positives and no doubtfuls; 5 per cent AL63 in Lanette wax base, 16 per cent positive or 27 per cent with doubtfuls; some of these positives may have been due to the Lanette wax base, which itself gave 3 per cent positives, and 9 per cent positive and doubtful results. A later series with 5 per cent AL63 in emulsion base gave no positives in the 20 "shirt" cases tested.

Two per cent issue soap showed 33 per cent positive, and 44 per cent positive and doubtful positive, which is very similar to the results in the controls. One cannot exclude the possibility that 2 per cent issue soap might be responsible for some of the reactions produced by the washed new shirt, the "broth" or the old shirt boiled with broth.

Too much reliance should not be placed possibly on these patch test results, but clinically the strong positives in some cases of the new shirt test (1), in marked contrast to the wholesale negative results in the first series with old shirts, suggested that the results might be significant.

The almost inevitable occurrence of purpura led to the investigation of capillary fragility. There were no other clinical factors to suggest avitaminosis "C," and red and white cell counts and platelet counts, done on a few cases, showed no abnormality. A sphygmomanometer cuff test for five minutes at 40 mm.Hg showed, in an area covered by a sixpence, petechiæ numbering from tens upwards to over 100 in 30 out of 37 cases tested; in a control series of 37 cases, 5 only showed petechiæ numbering from 1 to 4, which would be considered normal. A further series was carried out with the same sixpenny area and the sphygmomanometer at 80 mm. for five minutes. Tests were done on the arm below the antecubital fossa, the dorsum of the hand, and on the lower leg.

TABLE IV.—NO. OF PETECHIÆ.

<i>Case</i>	<i>Arm</i>	<i>Hand</i>	<i>Leg</i>	<i>Remarks</i>
1	51	0	0	
2	100	0	100	
3	0	0	0	(Non-purpuric rash)
4	14	0	0	
5	50	0	0	
6	60	0	20	
7	115	0	0	
8	35	0	2	
9	39	0	0	
10	6	0	0	
11	11	0	0	
12	38	2	0	(Rash on dorsum of hand)
13	96	0	0	
14	21	0	0	
15	6	0	1	
16	86	0	5	

Our results suggest that the purpura only comes as an accompaniment of the rash, for in no case was a positive cuff test found on any area previously unaffected by the rash. Unfortunately it was impossible to do successive tests to see if the purpura ever appeared before the eruption.

Nine cases with increased capillary fragility were treated with intensive vitamin C therapy for ten days or more; in only 1 did the number of petechiæ return nearly to normal (5), whilst in 3 the figure actually increased. In other cases without vitamins the capillary fragility tended to diminish as the rash improved. A careful inquiry into the diet showed that many of these men had been eating far more fruit during their passage through France and Belgium than they had ever eaten before; many also had been taking regularly the supplementary compound vitamin tablets, which were issued to the troops. These findings indicate that lack of vitamin C was not the cause of the purpura.

DISCUSSION.

The type of skin reaction described above is one with which we were previously unfamiliar. All the cases conformed to such a characteristic pattern as to suggest that the disease was an entity produced by a common cause. At first we thought that it was something peculiar to B.L.A., but

other Army dermatologists have told us that they have seen the condition elsewhere. Lieutenant-Colonel S. Hall saw it in Syria, Major G. A. G. Peterkin in Italy (*B.M.J.*, 1946) and cases have been recorded in U.K. Brigadier G. Bamber, however, says that he has never seen a case in Paiforce nor in India where, incidentally, the troops do not wear wool except for a short period in the winter in the north. It is possible that Twiston Davies (1944) described the same thing in his paper on khaki sensitivity, when he mentions 4 cases with a purpuric element and petechiæ marking the line of scratching. Unlike our cases, however, he records "that in addition to severe pruritus the skin feels tender and movement in the flexures is painful." In his cases patch tests to khaki were negative and there was no evidence of vitamin C deficiency.

The reaction was never primarily an eczematous one and it was not exudative unless traumatized. Positive patch test reactions always remained localized to the areas tested and did not cause a "flare up" of the original site affected. The primary onset of the rash was on those sites where the shirt pressed or rubbed against the skin, though later it usually spread more widely. This further spread could be explained by the well-known tendency of skin reactions to extend beyond the areas of initial irritation. In a large proportion the onset was symptomless and the rash discovered by accident. These conditions suggest that the rash was produced by some substance with a direct toxic effect on the skin and not by an epidermal sensitization. The severity of the rash over the axillæ, sacrum, etc., suggests that sweat may play some part in the production of the rash in addition to friction. Out of 176 patients, 96 (56.5 per cent) admitted excessive sweating compared with 23 per cent in a control group of 150. Another observation was that 61 (40.7 per cent) of 150 patients had recently returned from leave compared with 4.7 per cent in a similar number of controls; this is probably accounted for by increased friction during the long journey without a change of clothes.

The purpura is the most peculiar feature of the rash. At first we thought it might be due to some hazard of service in B.L.A., e.g. food, alcohol of the country, avitaminosis, etc., which might render the skin more vulnerable to friction. Careful histories and absence of other signs of avitaminosis excluded this and capillary fragility tests pointed to the probability that the purpura was an essential part of the eruption and did not occur in the absence of the rash. Possibly we are dealing with a direct toxic effect on the capillaries as well as the epidermis.

The primary distribution of the rash seemed to incriminate the khaki shirt as the vector of the irritant beyond any doubt. The irritant might be (a) the material of the shirt, (b) acquired during its manufacture, (c) the result of laundering the shirt, (d) connected with the anti-lousing of the shirt or individual. The condition did not occur among women and almost never among officers; both these had shirts of different texture from the men's and also rarely used the Army laundries.

The first possibility appears to be excluded by the history of wool irritability being no commoner in the patients than in controls and by the very rare positive patch tests with other woollen substances such as blankets,

vests and battledress. These results do not, however, rule out the special processes used in shirt manufacture.

The men's shirts were laundered either at the mobile laundry, by civilians or by the men themselves. At the former they exchanged their own dirty underwear for a freshly laundered outfit. The only common factor among these three methods seemed to be the issue soap and we wondered if inadequate rinsing left traces of it in the shirt ; this soap contains a fair amount of alkali. Patch tests, however, showed as many positives among controls as among the patients, and careful histories revealed some instances in which issue soap had never been used.

B.L.A. was the first British force to use D.D.T.-impregnated shirts and our attention naturally turned to this substance as a possible irritant. D.D.T. may come in contact with the skin either following dusting with AL63 Mk. 3 powder, by the use of new impregnated shirts, or shirts which have been treated by a proprietary preparation added to the final process of the mobile laundries. The evidence against D.D.T. being an irritant to the skin is considerable. There is no record of any reactions following the widespread use of anti-louse dusting in the Naples typhus epidemic not in the literature. In one D.D.T. factory at least, of which we have knowledge, it has not appeared as an industrial irritant among workers who are constantly handling it. Had the D.D.T. powder been the cause, one would have expected the rash to appear round the scrotum which is a very sensitive area and always gets well dusted. In point of fact the scrotum usually escapes. The few cases attributed to AL63 powder which we have seen have all been due to AL63 Mk. 2 which does not contain D.D.T. Our patch tests have been equivocal, even in the presence of an acute dermatitis, where one would have expected a strong positive from the real irritant. As mentioned above patients have worn gloves and socks powdered with AL63 without producing any real signs of the rash.

Fat soluble agents increases the penetration of D.D.T. into the skin and by incorporating AL63 powder in an emulsion base we did get a number of positive patch tests. The percentage positive was less than that produced by issue soap and raised the suspicion that we were dealing with a non-specific type of reaction from a primary irritant on a skin which was already inflamed. Finally, it is almost certain that the rash has occurred in men who have never been exposed to D.D.T., e.g. Syria in 1944 and in U.K., whilst in India the rash has not been seen though D.D.T. powder has been freely used.

It therefore seemed likely that we were dealing with some chemical irritant introduced into the material of the shirt during the process of manufacture. The history that a new shirt had been worn by 45 per cent of the last 85 cases seen led substantially to this supposition. At first we had 100 per cent negative patch tests with samples of old shirts, but when we started to use new shirts (these shirts were woollen but of American type with collar attached) we began to get very definite positive patch tests ; using these shirts new or after one washing we had 50 per cent positive and doubtful positive results : however, our experiences taught us that patch tests may be very unreliable

evidence, that they may vary even in the same patient when a test is repeated, and of course they do not reproduce the specific circumstances which exist when an irritant is reaching the skin from the shirt.

There are two difficulties which are not easily got over by our theory. The rash appeared sometimes in individuals who gave a reliable history of never having worn a new shirt. A possible explanation of this is that these shirts were at one time washed in the same container as a new shirt, and may in this way have become impregnated by some chemical irritant from the latter. We had hoped to prove this by patch testing with an old shirt which had been boiled with a new one or with the extract obtained after washing a new shirt ; up to the present our results have shown the case to be non-proven.

A second difficulty is that a comparatively long time might elapse between wearing a new shirt and the appearance of the rash. We have, however, seen many men who were quite unaware that they had the rash on the backs of their shoulders and buttocks ; it is possible that similar cases, which were minimally affected, might have remained quiescent for some time and either got well spontaneously or produced a widespread marked eruption when factors of friction, pressure, sweating, etc., became operative. An alternative suggestion is that the rash can be produced after prolonged exposure to minimal quantities of the irritant and shows itself only when circumstances are favourable.

It was disappointing to us that demobilization cut short the research which we had pursued for so many months. If, as our evidence suggests, the shirt is the vector of the irritant which produced the rash, analysis of the dyeing, the filling, or the finish of the fabric concerned, may provide the answer to the problem.

SUMMARY.

(1) A description is given of a hitherto undescribed type of eruption which occurred in large numbers of the troops in B.L.A. ; it is characterized by lesions over prominent areas in contact with the shirt.

(2) The rash is very frequently purpuric.

(3) It seems unlikely that D.D.T. plays any part in the development.

(4) The irritant factor may come from new shirts.

(5) An account is given of the investigations which led up to these conclusions.

We would like to acknowledge the help given to us by the dermatologists in B.L.A., with all of whom we have discussed this problem many times, and especially to Captain L. Divers, R.A.M.C., to whom some of the figures in this article are due.

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A REPORT ON TWO PERMANENTLY NON-MOTILE SALMONELLA VARIANTS

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VARYING degrees of flagellar inagglutinability are frequently encountered in recently isolated Salmonella strains. Motility is usually rapidly regained following one or more subcultures in nutrient broth, especially when culture is performed at room temperature. When this procedure fails to restore *H*-agglutinability, selection of actively motile forms by passage through semi-solid (0.3 p.c.) agar is nearly always successful. Such strains showing temporary loss of motility are, as a rule, actively *H*-antigenic when injected into rabbits. Artificially induced non-motile variants of normally motile bacteria, resulting from such procedures as growing the strain on phenol-agar, tend to revert rapidly to the motile form and, although non-motile and inagglutinable by homologous *H*-antisera, usually possess the power of absorbing *H*-agglutinin and, in particular, of stimulating the production of *H*-antibody. Occasionally in Nature there occur and, in the laboratory there arise, true and apparently permanent non-motile variants of members of the Salmonella and other groups which, in their serological behaviour, simulate cultures in which the labile *H* component has been completely destroyed by physical or chemical means. Such variants have played an important part in elucidating the problems of *H* and *O*-type agglutination (Smith and Reagh, 1903; Beyer and Reagh, 1904) and of the role played by *H* and *O*-antigens and their respective antibodies in the causation of an immunity to disease (Schütze, 1930). They have also demonstrated their practical value in the preparation of *O*-antisera and of agglutinable suspensions for use in the qualitative Widal reaction; non-motile variants such as *Bact. typhosum* strain 9010, *Bact. typhimurium* strain Glasgow (Schütze) and *Bact. typhosum* strain Vi(1) (Bhatnagar, Speechly and Singh, 1938) now being used almost universally for this purpose. The isolation of true *O*-variants of Salmonellas from disease in man is rare and the complete absence of flagella may give rise to difficulties in bacteriological diagnosis.

The object of this paper is to record the isolation from human infection of permanently non-motile variants of *Bact. paratyphosum* C and *Bact. paratyphosum* A.

Bact. paratyphosum C, strain No. 628/43.

This strain was isolated from the blood of an adult Indian male and was sent to this laboratory for identification by Major M. T. Parker, R.A.M.C., to whom we are indebted for the following clinical description of the case:

5.12.43: Admitted to hospital complaining of headache, fever and backache of four days' duration.

On Examination.—Temperature not raised; pulse 70; respirations 20; spleen one finger enlarged and hard; no other physical signs. In spite of the absence of fever, a blood film was said to have shown malaria parasites on the day of admission, although antimalarial treatment was not commenced until 7.12.43.

7.12.43: Temperature rose to 102.2° F., falling to normal again the next day.

9.12.43: Continuous fever developed, the temperature rising initially to 105° F., and lasted until 16.12.43, falling by lysis. During this time the patient's condition remained good and the pulse did not rise above 110. It does not appear that there was any intestinal disturbance, marked toxæmia or septic complications.

13.12.43: *W.B.C.* 1,800 per c.mm. Blood culture in sodium taurocholate broth—the organism in question isolated.

Widal and Weil-Felix Reactions.

Titres v.

			TO	AO	OX ₁	OX ₂
13.12.43	..	..	1/40	1/20	1/50	Nil
19.12.43	..	..	1/80	Nil	Nil	1/25
24.12.43	..	..	1/160	Nil	1/25	1/50

31.12.43: Stool and urine culture negative.

20.1.44: Discharged from hospital.

His illness was fairly trivial and, unfortunately, he was not exhaustively investigated. His serum was not tested for the presence of agglutinins against *Bact. paratyphosum* CO or *Bact. typhosum* Vi antigen.

Lieut.-Colonel Shone, I.A.M.C., in charge of the case, remarked: "... had not the man's blood culture been positive, his illness would probably have been called by one of the stock names reserved, according to fashion or ignorance, for such ailments."

Bacteriological Examination.—Strain No. 628/43 was found to possess the following properties:

Morphology: A Gram-negative, non-sporing, non-motile bacillus; indistinguishable, in stained preparations, from other members of the genus *Bacterium*.

Cultural Characteristics: Colonies on nutrient agar were indistinguishable from those of other *Salmonellas*.

Biochemical Characteristics: Glucose, maltose, mannitol, dulcitol, arabinose, mannose and sorbitol were fermented with the production of acid and gas. Lactose, saccharose, rhamnose, raffinose, inulin and inositol were not fermented.

H₂S was detected by stab culture in lead acetate agar.

Indol was not produced.

Serological Reactions.—*Somatic Structure:* (1) Strain No. 628/43 was agglutinated to titre by an O-antiserum prepared against a stock strain of *Bact. paratyphosum* C but not at all by *Salmonella* O-subgroup A, B and D antisera.

(2) An antiserum prepared by the immunization of a rabbit with strain No. 628/43 agglutinated an alcoholized suspension of the stock strain of *Bact. paratyphosum* C to its homologous titre. Strain No. 628/43 was agglutinated in granules only by this serum, no floccule formation being observed.

(3) Absorption experiments showed that strain No. 628/43 was capable of removing all O-agglutinin from *Bact. paratyphosum* O-antiserum. Similarly,

Bact. paratyphosum C exhausted all agglutinin from strain No. 628/43 antiserum.

The somatic structure of strain No. 628/43 is, therefore, identical with that of *Bact. paratyphosum* C and contains the antigens VI, VII.

Presence of Vi antigen in the strain.—The serum of a rabbit immunized with strain No. 628/43 developed a titre of 1/5,000 against *Bact. paratyphosum* CO and of 1/80 against *Bact. typhosum* strain Vi(1). Prior to injection the rabbit's serum did not agglutinate suspensions of either organism in dilutions of 1/5 or over. Results of simple agglutination and absorption tests between strain No. 628/43 and *Bact. typhosum* strain Vi(1) and their homologous and heterologous antisera are given in the table.

TABLE.

Serum	Absorbing suspension	*Titre v. suspension of			
		Strain 628/43		Vi (1)	
		Untreated	Boiled 1 min.	Untreated	Boiled 1 min.
†Vi (pure) ..	Nil	160	0	160	0
Vi (pure) ..	Vi (1)	0	—	10	—
Vi (pure) ..	628/43	5	—	10	—
628/43 ..	Nil	5,000	5,000	80	5

*Titre expressed as the reciprocal of the highest dilution of serum showing agglutination after two hours at 37° C. and 18 to 24 hours at room temperature.

†Produced by immunization of a rabbit with strain Vi (1), followed by complete absorption with *Bact. typhosum* strain 901H.

These findings, which will be discussed later, show that strain 628/43 shortly after isolation possessed at least a considerable part of the Vi antigen of *Bact. typhosum*. Soon after these investigations were carried out, however, Vi antigen became no longer detectable in suspensions of twenty-four-hour agar cultures. Thirty months later the strain was retested. Suspensions of overnight agar cultures proved completely inagglutinable by pure Vi antiserum both on a slide and in tubes and, in a concentration of 60×10^9 organisms per ml., failed to remove significant agglutinin from an equal volume of this serum. Logarithmic phase cultures, however, were agglutinated on a slide by an equal volume of pure Vi serum (titre = 1/160) but were not clumped by a 1/5 dilution when tested in tubes (see Hayes and Freeman, 1945).

Evidence of the Complete Absence of Flagella from the Strain.—Formolized broth cultures of strain 628/43 had shown no trace of H-type agglutination with either *Bact. paratyphosum* CH (specific) or *Bact. cholerae-suis* var. kunzendorf H antisera. The latter organism, now known as monophasic *Bact. cholerae-suis*, is identical with the flagellar group phase of *Bact. paratyphosum* C save for the absence from it of Vi antigen. An attempt was therefore made to produce a motile variant. The strain was passed through thirty subcultures in broth at 37° C. and each day the previous day's culture was examined for motility and seeded to one limb of a "U"-tube containing semi-solid (0.3 per cent) agar. The same procedure was repeated at room temperature. No motility was observed and the strain consistently failed to pass through semi-solid agar. After about twelve subcultures in broth a formolized broth culture was prepared and used to immunize a rabbit.

Rabbit No. 1 died after a single intravenous injection of 100 million organisms. Rabbit No. 2 received 100, 100, 200, 400, 400, and 400 million organisms in one ml. volumes at intervals of five days. Five days after the last injection the animal was bled. This serum agglutinated a formalized broth culture of strain No. 628/43 and a suspension of *Bact. paratyphosum* CO in granules to a titre of 1/5,000. No *H*-type agglutination was observed with the homologous culture. It failed, in a dilution of 1/25 or over, to agglutinate *H*-suspensions of any of the following organisms: *Bact. thompson* (k); *Bact. virchow* (r); *Bact. potsdam* (lv); *Bact. bareilly* (y); *Bact. enteritidis* (gm); *Bact. paratyphosum* A (a); *Bact. typhosum* (d); *Bact. paratyphosum* C (c); *Bact. newport* (eh); *Bact. abortus equi* (enx); *Bact. typhimurium* (i); *Bact. typhimurium* var. binns (123); *Bact. cholerae-suis* var. kunzendorf (5). These organisms cover between them the entire range of *H* antigens found in the *Salmonella* O-subgroups C₁ and C₂ (Bornstein, 1943).

Finally, antisera against *Bact. paratyphosum* CH (specific) and *Bact. cholerae-suis* var. kunzendorf *H* were heavily absorbed with suspensions of strain No. 628/43 without reducing at all their homologous titres.

Bact. paratyphosum A, strain 113/44.

This strain was isolated from the blood of a British sergeant and was sent to this laboratory for confirmation of identity by Captain J. Nicholas, I.A.M.C., to whom we are indebted for the following clinical account of the case:

The patient reported sick in February, 1944, and was admitted to hospital. He gave a history of an evening rise of temperature for four days prior to admission. He was also suffering from gonorrhœa and was under treatment with M & B 693. While in hospital he ran a continuous temperature, varying from 100 to 100·8° F., for fourteen days. Slight jaundice appeared about the thirteenth day but this gradually cleared. The patient had no complaints except of an occasional headache. He was discharged from hospital on 19.4.44.

Stool and urine culture negative.

Bacteriological Examination.—Strain No. 113/44 was found to possess the following properties:

Morphology: A Gram-negative, non-sporing, non-motile bacillus; indistinguishable, in stained preparations, from other members of the genus *Bacterium*.

Cultural Characteristics: Colonies on nutrient agar were slightly smaller than but otherwise indistinguishable from those of other *Salmonellas*.

Biochemical Characteristics: Glucose, mannitol, dulcitol, sorbitol and mannose were fermented with the production of acid and gas. Maltose, arabinose and rhamnose were fermented with the production of acid only. Lactose, saccharose, inulin, inositol and raffinose were not fermented.

Indol was not produced.

Serological Reactions.—**Somatic Structure:** Cross absorption tests demonstrated the identity of the somatic antigen of strain No. 113/44 with that of *Bact. paratyphosum* A. The strain therefore contains the somatic antigens I, II, XII₁, XII₃. Recent experiments have failed to demonstrate somatic phase variation in factor I of the strain, this antigen being highly agglutinable

by a *Bact. seftenberg* (I, III, XIX) antiserum in suspensions prepared from every colony picked (Kauffmann, 1941).

Evidence of the complete absence of flagella from the strain.—This strain was investigated along similar lines to strain No. 628/43. Motility could not be induced by repeated subculture in broth both at room temperature and at 37° C., nor by attempted passage through semi-solid agar. Antisera produced against a formolized broth culture of the strain agglutinated the immunizing suspension and suspensions of *Bact. paratyphosum* AH in granules only. The organism was completely inagglutinable by *Bact. paratyphosum* AH antiserum and failed to absorb any agglutinin from it.

DISCUSSION.

The strain of *Bact. paratyphosum* C and of *Bact. paratyphosum* A described above fulfil all the criteria necessary for their designation as true non-motile variants of the type strain.

(1) They are completely non-motile, have failed to show any evidence of motility after repeated subculture in broth and attempted passage through semi-solid agar.

(2) They have shown no trace of floccular *H*-type agglutination when mixed either with homologous antiserum or antisera against the flagellar antigens of motile strains of homologous type.

(3) They have failed to absorb *H*-agglutinin from antisera against motile strains of homologous type.

(4) On injection into a rabbit they fail to produce any *H* antibody either against themselves or against the flagella of any type within their homologous *O*-subgroups.

The diagnosis of *Bact. paratyphosum* strain No. 113/44 presented no difficulty since the somatic antigen of this type is unique in possessing the antigen II. Such, however, was not the case with *Bact. paratyphosum* C strain No. 628/43 since fifteen other Salmonella types belong to the *O*-subgroup C₁ and share with it a common somatic antigen. The identification of the strain depended upon the demonstration in it of the Vi antigen of *Bact. typhosum*. The only other Salmonella strains described as possessing this antigen are *Bact. ballerup* whose somatic complex has nothing in common with that of *Bact. paratyphosum* C, and *Bact. newport* whose *O* antigen contains the factor VIII not possessed by strain No. 628 (Bornstein, 1943). In this connexion the results of absorption tests tend to suggest that the Vi antigen in this strain is deficient in some minor component possessed by that of *Bact. typhosum*. Although both strain No. 628 and *Bact. typhosum* strain Vi(1) showed the same sensitiveness to agglutination by pure Vi antiserum, strain No. 628 removed this antibody to a greater extent against itself than against strain Vi(1), while incomplete absorption of the serum with strain Vi(1) removed all agglutinin against strain No. 628 but left a residual titre of 1/10 against the absorbing suspension. Unfortunately, rapid loss of Vi antigen by strain No. 628 prevented repetition of the experiment.

Both of these strains have now been in constant use for over two years for the production of *O*-antisera and agglutinable suspensions for issue to military laboratories in India, and have proved satisfactory in every respect. The sensitivity to agglutination of strain No. 628/43 is similar to that of *Bact. paratyphosum* CO suspension issued by the Emergency Vaccine Laboratory, Everleigh. The sensitivity of strain No. 113/44 is similar to that of the *Bact. paratyphosum* AO suspension issued by the Standards Laboratory, Oxford.

It is unfortunate that the serum of neither of the cases from whom these strains were isolated was tested for the presence of homologous *H*-agglutinin.

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SURGERY IN A GENERAL HOSPITAL IN JAPAN WITH THE BRITISH COMMONWEALTH OCCUPATION FORCE.

BY

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THE first three months of the British Commonwealth Occupation of Japan has proved of great interest surgically for, during this time, 380 major and minor operations, of which 238 were accident cases, have been performed in this hospital.

The hospital is the largest in the Force. It is so composed that it can deal with cases of every kind from each nationality. The patients have thus been Army, Navy, Air Force, Merchant Navy and Women's Services from Britain, Australia, New Zealand, India and, on occasion, from the U.S.A.

Situated in the old Japanese Naval Hospital overlooking the harbour of Kure, which used to be Japan's largest and most secret naval base, it has mountains and sea for its setting but close around are shattered and fire-scarred ruins. Ten miles away is the skeleton of Hiroshima where the first atomic bomb fell nearly a year ago.

The construction of the hospital is a strange contrast of modern and old-fashioned architecture and design. The operating theatre block and some of the wards and departments are modern, others are of wood and plaster at least sixty years old. Many alterations are still in progress for a typhoon recently swept away several buildings and the scars of bomb and fire can still be seen. The plumbing, electricity and steam heating are an inefficient mimic of the Western world and they seldom function together in harmony at one and the same time.

CLINICAL WORK.

This paper deals only with general surgery and orthopædics, which have been very varied in scope. Routine cold surgery has been very interesting as have the ordinary surgical emergencies. Many of the accident cases have been severe and have arisen from causes varying from numerous motor accidents to an exploding ashtray in an Officers' Mess supposedly the work of a Japanese saboteur.

On one occasion, a train struck a truck full of Australian troops resulting in 17 direct admissions and eight minor casualties. Two soldiers died from multiple injuries after this catastrophe.

More than 690 patients have passed through the surgical division in the last three months with an overall mortality of less than 1 per cent.

Thirty cases that were unlikely to be fit for full duty within three months have been evacuated to their home countries.

Four interesting and instructive cases resulting from accidents will now be described, followed by two relatively uncommon general surgical cases.

These are :—

ACCIDENTS.

- (1) Traumatic diaphragmatic hernia.
- (2) Rupture of the liver.
- (3) Rupture of a hydronephrotic horseshoe kidney.
- (4) Compound depressed fracture skull.

GENERAL.

- (1) Volvulus of cæcum.
- (2) Acute intestinal obstruction due to a wire bristle.

ACCIDENTS.

(1) TRAUMATIC DIAPHRAGMATIC HERNIA.

14.5.46 : L/Cpl. E., aged 21, whilst driving a jeep was involved in an accident causing the steering wheel to hit him in the abdomen.

Condition on Admission.—T. 98 ; P. 84 ; R. 20. He was feeling sick suffering from abdominal pain and dyspnœa.

On Examination.—Head and Neck : No signs of injury except that his lips were slightly cyanosed.

Chest : Apex beat two inches inside nipple line. Sounds normal. Trachea shifted to right.

Right Lung : Normal.

Left Lung : Breath sounds and percussion note normal at apex. No breath sounds left base—percussion note impaired. Borborygmi heard above diaphragm.

Abdomen : Abrasions left loin and over left lower ribs and left iliac fossa. Slight guarding left hypochondrium.

Limbs : Normal. Reflexes normal. Urine normal. Treated in bed in Fowler's position. Hourly pulse chart. Fluids only by mouth.

X-ray : Plain. 16.5.46 : "The stomach and splenic flexure of colon are visible in the left thorax at the level of the fourth rib anteriorly. There is marked displacement of the mediastinum to the right. The appearances are those of a large diaphragmatic hernia of the left leaf diaphragm."

Seen by O.C. Medical Division who confirmed diagnosis but advised that operation be postponed unless the general condition deteriorated.

17.5.46 : Patient vomiting and distressed, more cyanosed and the respiratory rate has increased to 40 per minute. So operation decided upon and preliminary blood transfusion commenced.

Anæsthesia, endotracheal oxygen and cyclopropane and controlled respirations, maintained during the operation.—A. S. B.

17.5.46 : *Operation.*—The patient was placed on his right side. An incision from the costal cartilages anteriorly to within 1½ inches of the spinous processes was made between the 7th and 8th ribs. One inch of the posterior part of each of these ribs was removed and the pleura opened. Most of the stomach and transverse colon was found in the thorax and the left lung was collapsed. A stomach tube was passed and the stomach and intestine were returned to the abdomen. A large triangular tear 4 inches long antero-medially and 2 inches long posterolaterally in the medial portion of the diaphragm

extending to its posterior attachment was repaired with nylon thread in two layers. At this stage there was some cardiac distress owing to mediastinal displacement. The chest was rapidly closed, sucked dry, and the lung insufflated by the anaesthetist. 50,000 units penicillin were instilled into the pleural cavity, dressings were applied and the patient returned to the ward.—J. A. V. N.

18.5.46 : General condition satisfactory.

20.5.46 : Large left pleural effusion diagnosed and confirmed by X-ray.

21.5.46 : Aspiration of 400 c.c. amber-coloured fluid. Penicillin instilled.

Aspiration was repeated on 23rd and 25th. Penicillin instilled.

1.6.46 : Chest screened.—Diaphragm high on left side and not moving. Small localized effusion present.

5.6.46 : Patient doing breathing exercises well, afebrile and feeling quite well.

14.6.46 : Patient has been up two days.

X-ray : Further re-expansion of lung has taken place. No fluid seen.

18.6.46 : Brought before a medical board so that he may be evacuated to U.K.

Result of Medical Board.—“Category Evac. for return to U.K.”

3.7.46 : Further X-ray chest showed still further re-expansion of lung which is now nearly normal in appearance except for some pleural thickening and a raised diaphragm.

10.7.46 : Embarked on hospital ship as a walking case.

The following case is of interest since conservative treatment has again produced complete recovery in what was obviously a fairly severe rupture of the liver. Thus bearing out wartime experience.

(2) RUPTURE OF THE LIVER.

Driver L., aged 19, was involved in a severe jeep crash on 14.5.46, and was brought in unconscious. He soon recovered consciousness but complained of severe pain in lower right side of chest and upper right side of abdomen. Also difficulty in breathing.

On Examination.—Pupils equal and react normally. T. 97 ; P. 110 ; R. 25. Grazes all over face—one black eye—severe laceration of lower lip. Apex beat normal situation—rhythm normal.

Chest : Breath sounds present and similar both sides—tender on pressure fore and aft between hands over lower five ribs.

Abdomen* : Very tender and rigid right upper quadrant. Bowel sounds present.

Limbs : Normal.

Urine : Normal.

Diagnosed Rupture Liver : Half-hourly pulse.

Patient too distressed and shocked to have an operation to repair the lip.

Penicillin injections 20,000 units three-hourly.

Pulse-rate persisted just around 120 per min.

15.5.46 : Abdominal pain and rigidity persist ; physical signs the same. Tender and rigid upper right quadrant ; bowel sounds present. Still very ill but not deteriorating.

16.5.46 : Slight improvement but all signs the same. Pulse 110 ; T. 99.6.

18.5.46 : Off penicillin, very much better, but still pyrexia up to 100°. Haemoglobin 90 per cent.

26.5.46 : Complained of sharp pain in right side of chest and cough. Worse on breathing—signs of large pleural effusion. Confirmed by X-ray.

28.5.46 : One pint dark amber fluid aspirated from chest.

31.5.46 : Further 26 oz. clear amber fluid withdrawn.

2.6.46 : Patient much easier.

9.6.46 : X-ray shows effusion all absorbed.

28.6.46 : Patient well ; getting up. Healed scar of lip excised and resutured.

10.7.46 : Patient quite well awaiting discharge to Convalescent Depot.

*X-ray chest in bed : Slight elevation right diaphragm. Nil else abnormal. Not screened.

(3) RUPTURE OF A HYDRONEPHROTIC HORSESHOE KIDNEY.

26.5.46 : Driver C., aged 22, was admitted at about 21.00 hours in a very comatose condition from a field ambulance. The military police had found him two hours earlier, having apparently been involved in a road accident. The field ambulance had diagnosed "a ruptured kidney on the right side," the patient having passed 400 c.c. of nearly pure blood *per urethram*. On admission, when he could be roused, he denied having been in an accident and said "I have always had a 'crook' right kidney and have had the same trouble before two years ago." However, he admitted that he had had a scrap and might have been hit in the loin.

On Examination.—Breath, alcohol ++. No signs of bruising or abrasions. Tender and rigid right loin. Passed more pure blood. Pulse 80 but rising. Still very drowsy.

Stomach washed out.

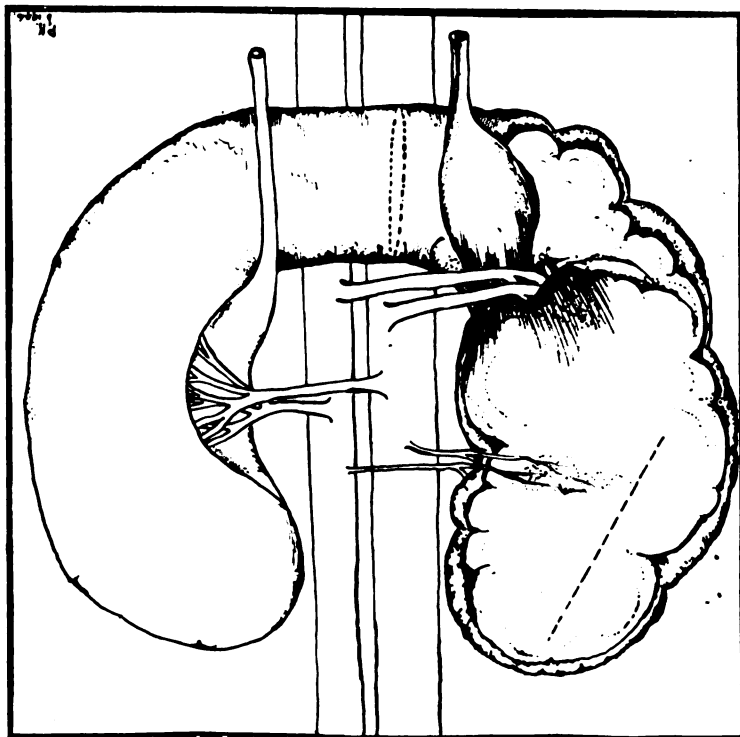
Chest : Normal. No other signs of injury.

Put on half-hourly pulse-chart.

At 23.00 hours pulse was 110 and operation was decided upon.

Preliminary blood transfusion 1 pint of blood given by drip and continued throughout operation.

Anæsthetic : Gas, oxygen and ether. Endotracheal.—A. S. B.



The horseshoe kidney is diagrammatically portrayed above to demonstrate the following points :—

- (1) Marked hydronephrosis right side, both of renal pelvis and kidney proper.
- (2) Double blood supply with large aberrant vessels constricting the right renal pelvis, the vessels passing in front of the ureter.
- (3) The line of section made through the isthmus.
- (4) The site and size of the rupture.

Operation.—Right subcostal lumbar incision (*see* Diagram).

At first no kidney could be felt but then a soft hollow viscus was felt and ureter traced to it. The upper pole could be made out but the lower pole extended across the vena cava and aorta to the other side—where normal kidney substance was felt in continuity. On delivery of the upper pole of the right kidney it was seen to be a sac full of dark blood with the pelvis and ureter dependent from it.

The ureter was clamped and divided and the right half of what was then recognized to be a horseshoe kidney was freed except for its pedicle and attachment to the other side.

The renal vessels which were smaller than normal were clamped and divided. The lower pole was then divided between clamps cutting through normal kidney substance. This was oversewn and all bleeding stopped.

The wound was closed in layers leaving a rubber drain emerging through the posterior angle of the wound.—J. A. V. N.

On examining the hydronephrotic half removed, it was found to have a tear 2 inches long on its inner aspect and was full of blood. There was a minute portion of normal kidney substance near the upper pole and for half an inch proximal to the line of division at the lower pole.

27.5.46 : Passed urine only slightly blood stained—condition fair.

28.5.46 : Urine clearer, some discharge from tube—general condition good.

1.6.46 : Urine almost free of blood—tube out—wound healthy. Patient suffering from a cough. Some atelectasis present.

10.6.46 : Wound healed, sutures out, cough better.

16.6.46 : Urine clear, albumin — ve, sugar — ve. No blood, acid.

B.P. 120/87. Patient getting up.

Brought before a medical board with a view to evacuating him to Australia.

X-ray intravenous pyelogram.—"Good excretion of dye. The appearances are typical of one half of a horseshoe kidney."

(4) COMPOUND DEPRESSED FRACTURE OF THE SKULL AND FRACTURED PELVIS.

Sapper A., aged 25, was admitted on April 16, 1946, half an hour after the jeep he was driving struck a train.

He was semi-comatose and restless. There was a transverse wound four inches long across the frontal region, showing fracture of the outer table, a deep laceration of the (R) cheek and severe contusion in the region of the (R) iliac crest.

Pupils were equal, constricted, and reacted slightly to light. There was spasticity of the (L) lower limb and the (L) knee-jerks and ankle-jerks were brisker than the (R). Both plantar responses were extensor. Blood-pressure was 130/100 and pulse-rate 96 per minute. There was a non-recent fracture of the (L) clavicle.

Eighteen hours after admission operation was undertaken.

Premedication atropine gr. 1/100 thirty minutes before operation.

The anæsthetic was induced with pentothal. The patient was intubated and the anæsthetic maintained with cyclopropane and oxygen.—A. S. B.

(1) The frontal wound was excised. A transverse guttered depressed fracture of the frontal bone was found. Entry was made into the skull by the removal of small depressed fragments, all of which were removed, including a considerably displaced portion of inner table. The dura was intact. Shortly, depressed portion of brain became elevated to its normal position and commenced to pulsate. Some extradural bleeding was arrested with muscle grafts and closure effected in two layers, with drain.

(2) The laceration of the (R) cheek was excised and sutured. E.S.

For ten days after operation, the patient remained semicomatose and restlessness was controlled by means of intramuscular paraldehyde. Feeding was effected through a Ryle's tube. The plantar responses varied from time to time. The spasticity of the (L) lower limb disappeared, and the (R) lower limb became spastic.

X-ray showed : (1) Linear fractures extending in three directions from the skull defect. (2) Fracture of both pubic rami of (R) side of the pelvis of the iliac crest and of the (R) auricular surface of the ilium. Displacement was present.

Treatment of the pelvis was not undertaken because of the general condition. Seven days after operation lumbar puncture showed clear fluid at a pressure of 7.5 mm. c.s.f. containing less than one leucocyte per c.mm. Ophthalmoscopic examination showed normal optic discs. On the tenth day after operation diminutions in the depth of semi-coma was observed, the patient speaking and sometimes answering questions. Improvement continued but mental changes persisted for several weeks. The favourite posture was the knee-elbow position, and rational conversation was not possible. At the date of writing (July, 1946) all mental changes have disappeared. There is no disability from the head and face wounds. The patient is ambulant and there is a limp due to the fractured pelvis and some residual spasticity of the (R) lower limb.

GENERAL.

(1) VOLVULUS OF CÆCUM AND ASCENDING COLON.

17.5.46: Pte. P., aged 19, was admitted complaining of epigastric pain and vomiting, commencing early this morning. Pain colicky in character with remissions, bowels open twice, loose stools, vomited several times and felt cold and shivery.

Gave a past history of having had an operation for "twisted gut" at age of 12.

Condition on admission.—Temp. 97.4; pulse 72; R. 20. Tongue slightly furred. C.N.S., nothing abnormal found.

Chest: Heart and lungs normal.

Abdomen: No marked distension or rigidity, but area above umbilicus is fuller and more uneven than normal. There is a supra-umbilical right paramedian scar from his old operation. Tender in the epigastrium.

Rectal examination N.A.D.

Diagnosis: ? recurrence of volvulus of cæcum. Not acute.

18.5.46: Much easier. No vomiting. On fluids by mouth; for barium enema.

20.5.46: Commenced vomiting again. Ryle's tube passed and continuous gastric suction commenced. Intravenous saline. Still no marked physical signs on palpation of abdomen.

21.5.46: No further vomiting.

X-ray: Barium enema.

Barium passes just short of splenic flexure. Plain film shows ascending and transverse colon enormously distended. Patient prepared for operation. Blood group taken and transfusion of plasma commenced by drip.

21.5.46: *Operation.*—Under cyclopropane oxygen. Anæsthesia.—A. S. B.

Right paramedian incision made, excising old scar. Free fluid ++. On opening peritoneum—intestine from terminal ileum to mid-transverse colon found enormously distended, twisted and partially strangulated but viable. Completely mobile cæcum. Volvulus was untwisted after delivering the twisted mass. Some adhesions round its base were resected and a blind cæcostomy was performed by inserting a rubber catheter through double purse-string sutures into the cæcum and bringing it out through a small gridiron incision in the right iliac fossa. The cæcum was sutured to the peritoneum at this point, surrounding the tube. The abdominal paramedian wound was then closed in layers.—J. A. V. N.

Post-operative intravenous therapy with one plasma to four glucose salines by drip was continued together with continuous gastric suction.

23.5.46: Gastric suction stopped, but recommenced because patient started to vomit showing signs of paralytic ileus.

Morphia gr. 1/6 four-hourly for three doses.

26.5.46: Patient better, cæcostomy draining, stopped suction.

1.6.46: Abdominal wound sutures out. Tube out of cæcostomy two days ago—less discharge, diet increasing.

15.6.46: Very little discharge—patient feeling well and getting up.

18.6.46 : Patient recommended for a medical board with a view to evacuating him to Australia.

4.7.46 : Cæcostomy closed spontaneously. Patient very fit.

(2) ACUTE SMALL INTESTINAL OBSTRUCTION DUE TO A WIRE BRISTLE.

On June 25, 1946, Pte. D., aged 19, was admitted complaining of severe intermittent colicky abdominal pain for the last sixteen hours. Pain was around and slightly above the umbilicus. He had vomited bile-stained fluid repeatedly during the previous six hours and had not had his bowels opened for the past two days.

Past History.—Two similar attacks, one year ago, and two days ago, but for the past year his bowels had been irregular. Constipation for two or three days followed sometimes by diarrhoea.

Condition on Examination.—T. 99; P. 100; R. 20. Patient in pain, looking anxious. Tongue furred. Tender rigid abdomen. Tenderness most marked in the middle around the umbilicus. Rectally very tender in mid-line high up. Auscultation, no bowel sounds heard.

Plain X-ray performed : No distended coils of gut seen.

W.B.C. 13,600 per c.mm.

Diagnosis.—Acute small bowel intestinal obstruction. Intravenous saline infusion commenced.

Operation.—Under oxygen cyclopropane anaesthesia—A. S. B.

Right paramedian incision. Free blood-stained fluid in peritoneal cavity and coils of almost black small intestine seen. On palpation a hard band constricting the mesentery beneath which a loop had become partially strangulated was felt. This was divided and found to consist of fibrous tissue around a wire bristle which was perforating through the wall of the ileum and was attached to another loop of ileum. The gut, on release of the band, immediately recovered its normal colour. The opening from which the bristle was removed was invaginated and oversewn with fine catgut. The appendix was removed, and the abdomen closed.—J. A. V. N.

Post-operative gastric suction by a Ryle's tube was continued with intravenous salines and plasma until the stomach contents were clear and peristalsis was resumed three days later. Since then convalescence and recovery have been uneventful.

It was suggested that the wire bristle may have come from a brush used to clean potatoes, but the patient had no knowledge of ever having swallowed it.

TABLE OF OPERATIONS PERFORMED.

Chest.

Mastectomy for gynecomastia	3
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Abdominal.

Excision fibro-adenoma	1
Heminephrectomy of a horseshoe kidney	1
Appendicectomy	28
Volvulus of cæcum	1
Hernia inguinal	13
Epigastric hernia	2
Regional ileitis	1
Small intestinal obstruction	1
Duodenal perforation	1
Epididymectomy and vasectomy	1
Repair of ruptured bulbous urethra	1

Thoraco-abdominal.

Repair traumatic diaphragmatic hernia	1
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Head and Neck.

Craniotomy	3
Laceration of scalp and face	25
Partial thyroidectomy	1
Excision of thyroglossal cyst	1
Excision of thyroglossal fistula	1
Excision rodent ulcer	1

Anal.

Rectal prolapse (Lockhart Mummery)	1
Fistula in ano	4
Hæmorrhoidectomy	18
Ischiorectal abscess	2
Fissure in ano	6
Circumcision	16

<i>Infections of the hand</i>	25
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Orthopædic.

Recurrent dislocation of shoulder	2
Excision semilunar cartilage	8
Arthrograms of the knee	5
Excision head of radius	1
Tendon suture of hand (long tendons of thumb)	2

Burns.

Burns electric	4
Burns simple	6

Fractures.

Vertebrae	2
Upper limb-humerus	2
Upper limb-scapula	2
Upper limb-radius and ulna	2
Colles	19
Lower limb—femur	1
Compound patella	2
Tibia and fibula	3
Cuboid	1
Os calcis	3
Skull (excluding facial bones)	7

Miscellaneous.

Including lacerations, cystoscopies and pyelographies, minor infections and lesser fractures.

OTHER ITEMS OF INTEREST.

A case of osteogenic sarcoma of the clavicle was diagnosed and flown back to Australia as quickly as possible.

Varicose veins are scarcely ever seen among the Australian troops, inguinal herniæ being almost equally rare.

Numerous testicular swellings have been seen among the Indian Troops. Several have been specific, traumatic or tubercular, but the majority are difficult to label.

In spite of the large number of accidents dealt with, fractures of long bones have been very rare. This can be largely attributed to the scarcity of motor cycles in the Force.

SUMMARY.

(1) A general review of surgery with one General Hospital of the British Commonwealth Occupation Force in Japan has been given.

(2) Cases of unusual academic interest have been described, demonstrating that military hospitals in peace time can provide more interest and experience clinically than is usually credited to them.

(3) Experience in War Surgery is proving of benefit in dealing with peace time accidents.

IN CONCLUSION.

We should like to express our gratitude to those M.O.s and Sisters while working under very difficult conditions who have assisted us in steering these many cases through to recovery.

To Brigadier C. Scales. *M.C.*, for permission to submit this article, and to Colonel G. S. N. Hughes. *D.S.O.*, The Commanding Officer, for his constant help and encouragement.

Clinical and Other Notes.

FOUR UNCOMMON ABDOMINAL TUMOURS

BY

Colonel A. G. HARSANT

(*From the Wards of the Egyptian University, Cairo.*)

[Received April 26, 1946.]

FOUR cases are here reported, each presenting some unusual features :—

(1) A male, aged 50, with large unilocular hæmorrhagic cyst of the spleen, causing symptoms of abdominal colic, and presenting a mass palpable to the right of the mid-line.

(2) A woman, aged 20, with a large cystadenocarcinoma of the pancreas, having metastases in the liver known to have been present for nearly three years.

(3) A woman, aged 35, also with a large cystadenocarcinoma of the pancreas, but with a short history, and short survival. Although the large tumour occupied all the region of the head and neck of the pancreas, and grossly displaced the duodenum, there was no obstruction to the bile duct.

(4) A 3-parous woman, aged 22, with a large tumour of the right adrenal gland and metastases in the liver and peritoneum, presenting, with great wasting, masses in the abdomen, and atrophy of the sex organs; eighteen months after a normal pregnancy and delivery.

Case 1.—H. E., a farmer, aged 50, was admitted February, 1939, for investigation of a supposed chronic intestinal obstruction, of a few months' duration. He denied any trauma. He had been ill in the country for two weeks, about six months previously, but had not had any recurrences. Soon after he began to get dyspepsia, aching pain in the left hypochondrium, colic and constipation, without vomiting.

Of fair health, he presented an indefinite soft fullness in the left hypochondrium with a more prominent, smooth, rounded, non-tender lump, beneath the right rectus muscle, moving on respiration. Fluctuation was not recognized; there was no visible peristalsis.

After barium meal, screening and barium enema, a provisional diagnosis of pancreatic cyst was made. Pyelograms were not done.

At operation, through a long left paramedian incision, under spinal anæsthesia, a very large thin-walled unilocular cyst was seen occupying the whole left upper abdomen as far as the mid-line, where it was found to arise from the entire left surface of an enlarged spleen, with adhesions to gut and omentum.

The spleen, of normal appearance and consistence, was of about double the normal size. The spleen and cyst were removed without great difficulty. The splenic artery was very large, tortuous, and sclerotic. The cyst when fixed, measured 22 cm. by 8 cm., but was considerably larger before fixation. It was unilocular, the deep wall being formed apparently by splenic tissue covered by fibrin, without a specific lining; the contents were altered blood, with large flakes and sheets of red-brown fibrin.

Microscopically, there was no evidence of malarial or bilharzial infection of the spleen.

Recovery was uneventful.

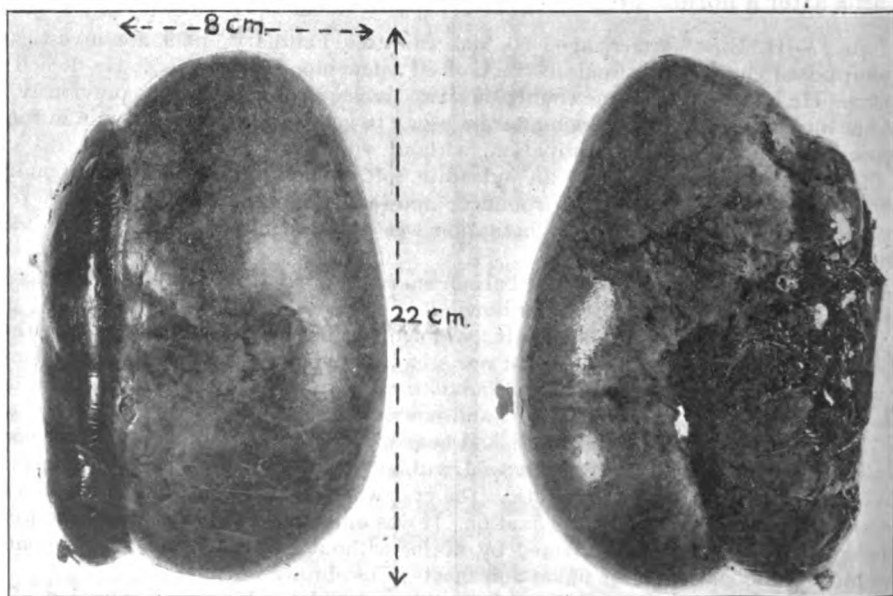


Barium Enema.



Barium Meal.

CASE 1.



Anterior aspect.

CASE 1.

Posterior aspect.

Cysts of the spleen have been reviewed by Fowler (1940) and by McClure and Altemeier (1942). The latter classify them as :—

- (1) True cysts (lined by a specific membrane).
 - (a) Epithelial. Dermoids and epidermoids.
 - (b) Endothelial. Lymphangioma, hæmangioma, polycystic disease.
Some serous cysts.
 - (c) Parasitic.
- (2) False cysts (not lined by a specific membrane).
 - (d) Hæmorrhagic.
 - (e) Serous.
 - (f) Inflammatory. Chronic tuberculous. Acute necrosis in infections.
 - (g) Degenerative, liquefaction in infarcted areas.

Fowler collected 137 cases. These were added to by McClure and Altemeier (1942), Deneen (1942), and by Gallagher and Mossberger (1942), bringing the total to 155. Fowler states that parasitic cysts are twice as frequent as all other forms, and that 80 per cent of all false cysts are large and unilocular.

In the aetiology of these unilocular cysts, it is usually considered that trauma, with or without antecedent disease (e.g. malaria), has been a common feature. Others have found these cysts more frequent in women during the child-bearing age, and have related them to menstruation or pregnancy.

Symptoms will be due to the size of the spleen and cyst, and a palpable tumour may be either the spleen in an abnormal situation, displaced by the cyst, or may present as a cyst only, when it arises from the caudal end of the spleen, or as an enlarged spleen, when the cyst is situated at the upper pole, and thus hidden from palpation.

Differential diagnosis will thus usually involve a consideration of :

Forms of splenomegaly.

Subphrenic abscess displacing the spleen.

Cystic swellings of pancreas, kidney, left lobe of liver, omentum, mesentery, or ovary.

and should be made after investigation by barium meal and enema, by pyelograms and by specific tests for hydatid disease.

Case 2.—R. I., a female, aged 20, was admitted February, 1944, complaining of abdominal masses, colic, and steadily increasing abdominal distension.

She had been in hospital in March, 1941, under the care of another surgeon, when she was 16 years old and unmarried. Three years before this (aged 13), she had an attack of fever, loss of weight, jaundice, and constipation, relieved by enema. Later, she noticed a painless lump in the abdomen.

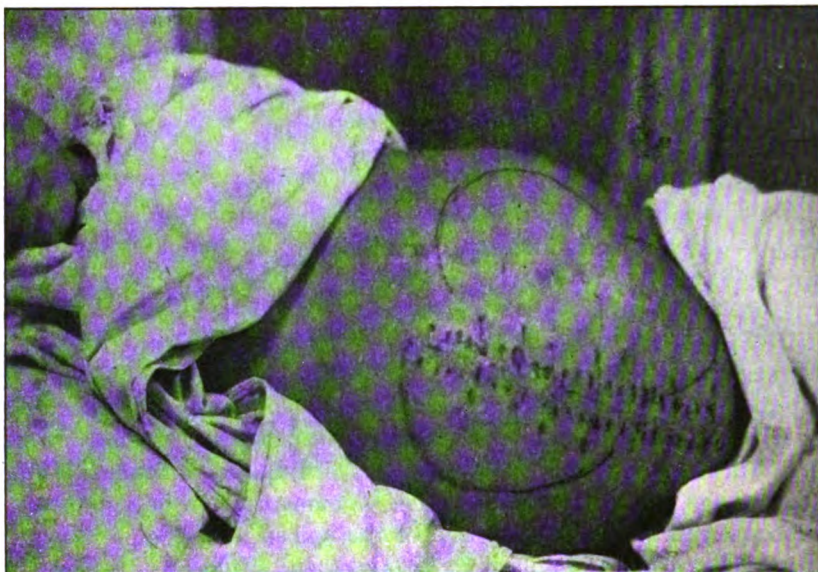
When aged 15, she commenced to get attacks of abdominal colic and enlargement of the abdomen, but without any more jaundice.

During her stay in hospital in 1941 she presented a large tumour in the left side of the abdomen, suspected of being Egyptian splenomegaly. At laparotomy the mass was found to be in the region of the mesocolon with adherence to the stomach, and there were secondary deposits in the liver.

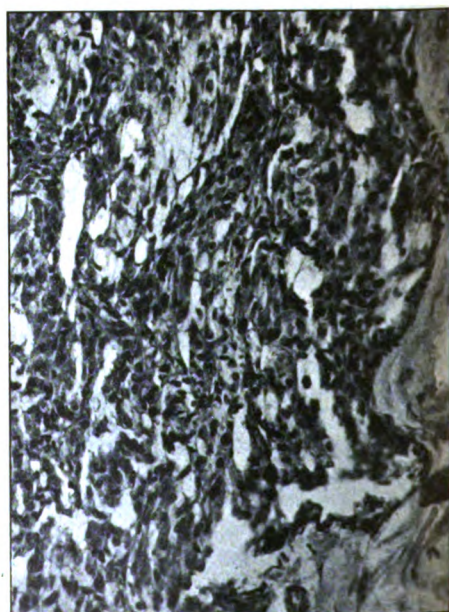
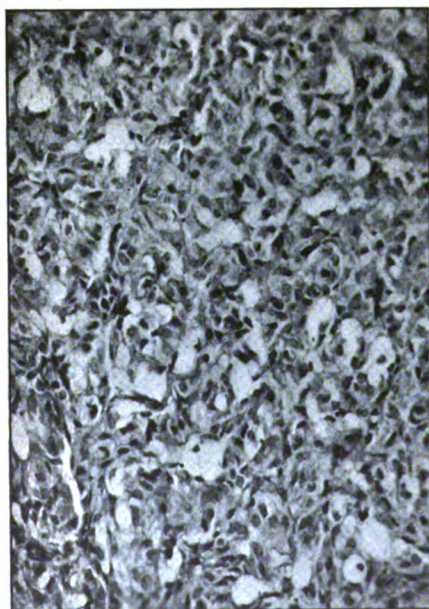
There was no record of a biopsy having been done. Diagnosed as "sarcoma of the mesocolon." She was considered unfit for Roentgen treatment and was discharged.

Her abdomen continued to enlarge, there were mild attacks of colic, but bowels were regular, no changes in the stools, no urinary symptoms, and catamenia were normal.

On re-admission, February, 1944, her abdomen was very distended, with a huge trilobar cystic swelling occupying most of the abdomen, which could not be felt by rectal examination. There was not any jaundice.



CASE 2.—Female, aged 20.



CASE 2.

Laparotomy, February, 1944. Bloody fluid in the peritoneal cavity. Transverse colon and hepatic flexure pushed down and to the right by an extensive lobulated

retroperitoneal swelling, fixed to the vertebral column in the region of the pancreas. Huge venous channels and omental adhesions prevented accurate localization of its origin. The bile ducts were not dilated. There were one large and several smaller deposits felt in the liver. A biopsy was taken from one of many small protrusions from the cystic mass and the abdomen closed. She recovered, was discharged from hospital, and was lost sight of.

Pathological report: Appearances suggesting metastasis from carcinoma of the pancreas. There are masses of epithelial cells, of various shapes and sizes, showing a hydropic degeneration, with a delicate stroma. There are three histological pictures: (1) Solid masses of cuboidal and cylindrical cells; (2) definite glandular formation; (3) cysts, with intracystic papillary projections.

The age of this patient was unusual. Moreover, even if the tumour commenced as a benign cystadenoma, it appears to have been frankly malignant for three years (as evidenced by the presence of secondaries recorded at laparotomy in 1941), during which time she had enjoyed fair health.

Lichenstein (1934) classifies pancreatic cysts associated with malignancy as: (1) Solid adenocarcinoma, with epithelial-lined cysts; (2) epithelial-lined cysts of the pancreas present simultaneously with, but not arising from, adenocarcinoma of the pancreas; (3) papillary adenocarcinoma.

Kennard (1941) reviewed the literature to 1940, and lists 25 "malignant cysts of the pancreas," but all of these do not represent clear-cut examples of cystadenocarcinoma.

Brunschwig (1942) discusses the question whether all apparently benign cystadenomas of the pancreas should be considered precancerous.

If this were established, it follows that all such benign cysts should be radically removed on discovery, even if this involves partial or subtotal pancreatectomy.

In Kennard's series there was no instance of prolonged survival *after* the malignancy was established. In 4 cases, patients survived five and a half to ten years after marsupialization for cystic disease of the pancreas, eventually dying of carcinoma, but there was no evidence when the carcinoma arose.

Case 3.—H. K., female, aged 35, admitted December, 1944, with an abdominal swelling. She felt perfectly well till four months previously, when she commenced to complain of a diffuse pain in the back and abdomen, later localizing in both hypochondria. It was never severe, was rather worse after eating, and there had never been any jaundice. No history of trauma.

General condition fair; no icterus. A large oval, smooth, elastic intra-abdominal tumour occupied the epigastrium down to the umbilicus. It did not move on respiration, could be moved somewhat from side to side, but not up and down. Dull on percussion.

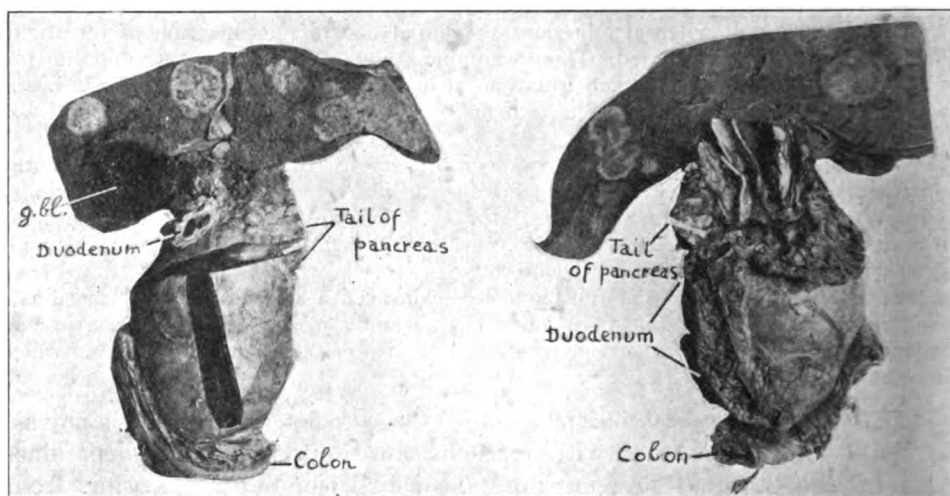
Barium meal demonstrated that the stomach was displaced down and to the left by a mass which did not involve the stomach wall.

At laparotomy most of the head and body of the pancreas appeared to be replaced by a large oval cystic tumour, which overlapped and hid the duodenum. There were numerous large metastases throughout the liver, but no free fluid in the peritoneal cavity, and no adhesions. The bile ducts were not obstructed.

One metastasis from the margin of the liver was excised for biopsy.

Histology.—"The section showed anaplastic adenocarcinoma (showing degenerate and cystic changes) infiltrating the liver. Primary growth—probably in the pancreas"

Her general condition slowly degenerated, and she died after about four weeks. A local post-mortem only was allowed. Most of the pancreas was occupied by a large oval cyst containing red colloid material or clot. The cyst overlapped the duodenum in all



CASE 3.—Female, aged 35.
Anterior aspect. Posterior aspect.

directions, but there was no obstruction to the bile duct. The only normal pancreatic tissue appeared to be in the tail. The liver was studded with large and small secondary deposits.

Case 4.—M. R. M., Egyptian female, aged 22. Married with 3 children, the last born eighteen months ago after a normal pregnancy and delivery and, she alleges, a normal lactation.

She complained of weakness, amenorrhœa since the birth of the last child, and of a lump in the abdomen which she had first noticed while pregnant, separate from the uterus.

On admission, in April, 1941, she presented a very distended abdomen, together with extreme wasting of the chest and extremities, which latter appeared like a skeleton covered by skin only. The breasts were represented by nipples on the thoracic cage, mammary tissue not being palpable. She had a very large, fixed, non-tender mass occupying the right side of the abdomen and loin, and two other masses—of the sizes of a grape fruit and orange respectively—in the left hypochondrium and left lower abdomen. On vaginal examination, the cervix could not be felt. On inspection, the vagina was short, wide and lax. The only trace of a cervix was a dimple—completely epithelialized over, with no trace of an orifice. The uterus was very small. The masses were not felt from the pelvis.

Plain X-ray showed a large oval lightly calcified swelling in the renal area. Ascending pyelogram demonstrated that this mass displaced, without involving, the kidney.

Blood-pressure was not raised. No hirsutes. No abnormal pigmentation. No vomiting.

Urine: No sugar, a trace of albumin, no deposit. Stools—no protozoa or cysts.

Blood-pressure 140/80, 135/70, 110/75, 110/80, 110/75, on successive examinations while in hospital.

Blood chemistry: Urea 28 per cent, sugar 0.09 per cent, chlorides 432 (520, 526) mg., and cholesterol 130 (108, 160) mg., on successive examinations.

Laparotomy in July, 1941, showed a large fixed tumour, pushing down the right kidney into the iliac fossa, but not involving the kidney substance, together with a spherical mass in the right and in the left lobes of the liver, and a fourth mass surrounded

by adherent gut and omentum in the left iliac fossa. Owing to the great vascularity of the tumour it was considered inadvisable to take tissue for biopsy.

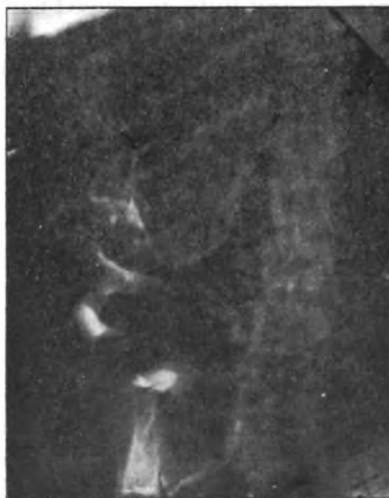
The uterus and ovaries were felt to be very much atrophied.



CASE 4.—Female, aged 22



CASE 4



CASE 4.—Ascending Pyelogram.

Her subsequent progress was one of slow steady wasting, without vomiting, diarrhoea, hirsutes, pigmentation or pain.

Unfortunately, her relatives removed her from hospital about five weeks after operation, and she was lost sight of.

The pathology would appear to have been a carcinoma of the cortex of the adrenal gland. In this case, the endocrine symptoms were a loss of femininity, rather than a masculinization, i.e. loss of breast tissue, atrophy of uterus and ovaries, complete atrophy of the vaginal cervix, with epithelialization over the site of the external os, but without alteration of habitus, or alteration of hair distribution—all occurring within twelve to eighteen months.

Cahill (*et alia*, 1936) in a review of adrenal cortical tumours state that these may present as: (1) Tumour with endocrine symptoms; (2) tumour alone; (3) tumour with metastatic masses; (4) tumour with arterial hypertension (continuous or paroxysmal).

X-ray diagnosis of adrenal tumours is usually made by demonstration of a dense shadow, displacing that of the kidney; by pyelograms, or by air or CO₂ infiltration in the perirenal fascia.

The last procedure is, however, not entirely free from danger of air embolism. Calcification is not common in adrenal tumours, but Bachman (1939) gives several references from the literature of calcification in examples of gangli-neuroma, psammoma, and in bilateral cortical carcinoma of the adrenals.

Roome (1939) describes his technique of air injection as done in 15 cases for investigation of adrenal virilism, while Hyman and Willis (1938), in a discussion of the differential diagnosis of suprarenal tumours, consider that perirenal insufflation is of little value, and has dangers of air embolism. They state that, while an intrinsic tumour of the upper pole of the kidney will usually distort the pelvis or upper calyces, a large tumour of suprarenal origin will dislocate the kidney without causing any deformity of the upper calyces.

Vines (1936) states that cortical carcinomas form the bulk of adrenal neoplasms, and are of two histological types—adenocarcinoma (the more common) and fully developed carcinoma.

He finds that the latter are not associated with any marked effect on the sexual system, and that masculinization of neoplastic origin is found only in relation to the adenocarcinoma type.

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THE TREATMENT OF TROPICAL ULCER.

BY

Major E. A. SMYTH,

Royal Army Medical Corps, Graded Surgeon.

[Received June 27, 1946.]

DURING my three years as a Prisoner of War in Siam, I personally treated 637 cases of tropical ulcer in our camp hospital. This does not include hundreds of tropical ulcers who were treated as out-patients.

The following is an exact copy of notes I made about his condition while I was still a Prisoner of War.

TROPICAL ULCERS.

These were one of our biggest menaces. At first I was unable to find anything to check their rapid growth and the destruction of tendons and bones. I was forced to amputate above the knee in eight cases. Later, I discovered a very efficient method of treatment. I received the idea from Manson Bahr's "Tropical Medicine." This treatment was as follows :—

We will assume that a case is admitted to hospital with a tropical ulcer three or more inches in diameter over the anterior surface mid-third of the leg. The edges of the ulcer are raised and the floor is covered by a thick layer of pus. The skin surrounding the ulcer is inflamed.

Treatment.—Six times per day, the pus is washed or syringed off with warm water (preferably containing P.P.). Adherent portions of the pus which are not removed with the washing are gently removed with Kapok or cotton-wool swabs made with bamboo sticks. The floor of the ulcer having been freed of pus a thin layer of pure carbolic acid is applied to the whole surface of the ulcer by means of a Kapok or cotton-wool swab, as already described. The carbolic acid is washed off five minutes later. Pure carbolic acid is harmless to the ulcer but is likely to trickle over the edge and cause nasty ulceration of the surrounding skin. While the skin around the ulcer is inflamed, as many fomentations as possible are applied in the interval between the carbolic acid treatments. At night, and during the intervals of treatment during the day, an oily dressing is applied. When the condition of the ulcer shows improvement, i.e. raised edges disappear—the floor of the ulcer becomes a red granulating surface free from pus—the treatment is gradually changed as in the following example :—

June 1.—6 daily applications of pure carbolic acid.

June 6.—3 applications of pure carbolic acid and 2 applications of 1 in 13 carbolic.

June 10.—2 applications of pure carbolic acid and 3 applications of 1 in 13 carbolic.

June 18.—5 applications of 1 in 13 carbolic.

June 30.—4 applications of 1 in 13 carbolic.

July 20.—3 applications of 1 in 13 carbolic.

Aug. 20.—2 applications of 1 in 13 carbolic.

Seldom is the treatment ever reduced below two daily applications of 1 in 13 carbolic (to prevent recurrence). The carbolic applications are maintained until the ulcer is completely healed. Even when used on the largest ulcers (over 7 inches in diameter) no signs of carbolic acid poisoning (such as albuminuria) ever appeared.

In order to economize on carbolic acid we have been using a mixture of 2½ per cent carbolic in 1 per cent perchloride of mercury, instead of the 1 in 13 carbolic. It has worked equally as well but is slightly painful. Iodoform does increase the rate of healing in the later stages when all signs of the active tropical virus have disappeared. Sulphonamides used locally, have the same effect as iodoform. I have found sulphonamides and iodoform of little or no value at all in dealing with the ulcer during the active stage. We have not, of course, had sufficient available to give it a proper trial.

Had I used this treatment at the beginning I consider that I should have been able to avoid some of the amputations. At one period, in 1943, we had over 200 cases of tropical ulcers in the hospital and in order to carry out this treatment a large staff was necessary. The staff allowed by the Japanese for 900 hospital patients was quite insufficient. The difficulty was got over by the employment of sixteen volunteer Regimental Officers who completely took over the ulcer patients.

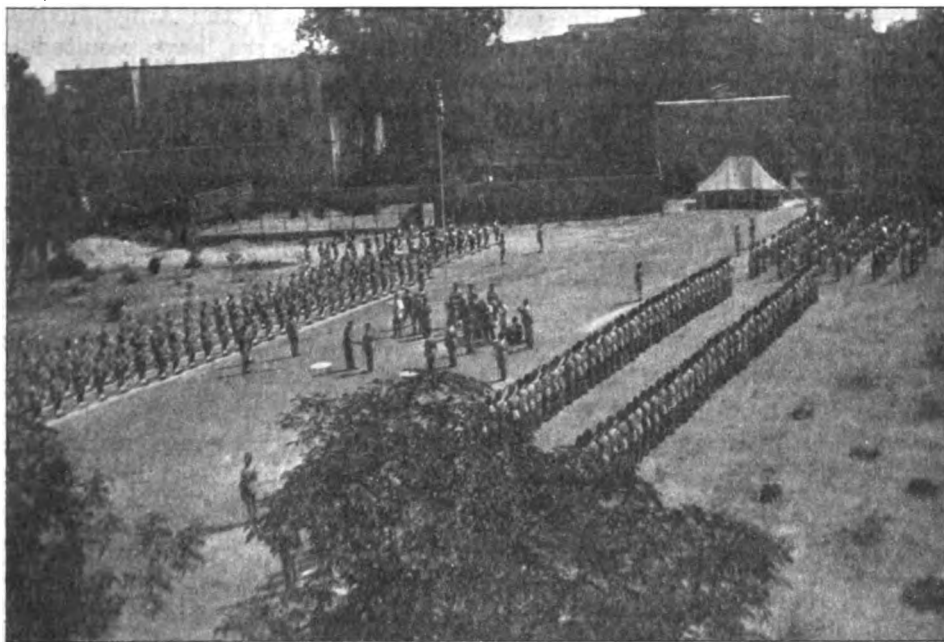
THE CITADEL, CAIRO.

WE have received from Brigadier K. A. M. Tomory, *O.B.E.*, Deputy Director of Medical Services, British Troops in Egypt, a note on the handing over of the Citadel in Cairo to the Egyptian Army.

The ceremony was simple but impressive. Guards of Honour, furnished by the 1st Battalion, The Highland Light Infantry and the 1st Garrison Battalion of the Egyptian Army, presented arms as the British and Egyptian National Anthems were played. The Union Jack was lowered, and the final return of the Citadel to Egyptian care was symbolized by the gift of a silver key which was presented by Lieutenant-General Sir Charles Allfrey, *K.B.E.*, *C.B.*, *D.S.O.*, *M.C.*, General Officer Commanding British Troops in Egypt to Lewa Ferik Ibrahim Attallah Pasha, Chief of General Staff of the Egyptian Army.

Many serving and former members of the Royal Army Medical Corps, The Army Dental Corps and the Nursing Services will regret this loss. The Citadel was not an ideal station; Mohamed Ali's harem was never quite an ideal hospital building; the magnificently painted ceilings had lost some of their freshness; the woodwork provided many safe refuges for the families of *Cimex lectularius* which were never quite exterminated (unless perhaps in the last few years the use of D.D.T. has changed the picture); Mohamed Ali's stables and his coachmen's quarters, though extensively converted, did

not make the most comfortable and convenient of Officers' Messes. But these discomforts and inadequacies will be forgotten, just as the dreary journey from Cairo or Gezira, the hot dusty wind from the Mokattam Hills and the numerous immigrant flies will be forgotten. Memory will retain the happier thoughts: the joy of coolness inside a thick-walled building on a hot day, the distant view on a clear day, old friendships, iced "limoun," and the incredulous entertainment of discovering that the initials of Doctor I. A. Fidelis (whose surgery, complete with brass plate, lay just outside the Citadel) stood for In Arduis and that Doctor Fidelis was in fact an enterprising N.C.O. of 33 Company R.A.M.C.



The loss of anything which we have held for long ministers to the current mood of homesickness for the past. We have lost so much in the past few years that any further loss makes us wonder how soon there will be nothing left. Not many who have served in the Citadel would seriously feel that the passing of the Citadel is in itself a great tragedy; yet they will think of the Citadel as a former home, full of memories and peopled with the ghosts of old friends.

Some links with the past remain. The Military Hospital moved from the Citadel in October, 1939, took over the Artillery Barracks at Helmiéh as 2/10 General Hospital, and has remained there as 63 General Hospital ever since. The Officers' Mess and the Serjeants' Mess silver was moved with the hospital and is still in use. And three of the Officers' Mess servants with eighty-seven years' of service between them—Antonio Lucas (known for many years as Tony) and Hassian Said Hassian and Ibrahim Said Hassian who joined the Mess staff together in 1914.

RECOLLECTIONS.

BY

Lieutenant-General Sir JAMES A. HARTIGAN,
K.C.B., C.M.G., D.S.O., M.B., D.Ch.
Colonel-Commandant, Royal Army Medical Corps.

[Received September 16, 1946.]

IN the near future an old gentleman, now approaching the allotted span of three score years and ten, will cease to be a Colonel-Commandant of the R.A.M.C., thus ending an official connexion which began forty-seven years ago.

Those years have witnessed some of the most stirring events in the world's history. They have also witnessed striking changes in the Army Medical Services—changes which, in spite of occasional set-backs, have resulted in remarkable progress being achieved. Perhaps a few stray comments on some of these changes may be of interest. They are written from memory, as there has been no opportunity of checking their accuracy with official records.

On joining the Army in 1899 we went to Netley as Surgeons on Probation (S.s.O.P.). Our period there was cut short by the outbreak of the South African War, but it was sufficiently long to acquire a lasting *esprit de corps* and to form lifelong friendships with other members of the "batch."

It was usual for S.s.O.P. on completion of their course at Netley to proceed to the Depot at McGrigor Barracks, Aldershot, but, because of the war, this was delayed in our case, and I personally did not do the Depot course until after my return from foreign service six years later.

On the medical teaching at Netley, bacteriology was the most notable, as might be expected with Almroth Wright as Professor and Leishman (then a junior Major) as his principal assistant.

In addition to our work at the Army Medical School we each had charge of one or two wards and I well remember my first inspection by the divisional officer who showed grave displeasure at finding a packet of cigarettes and a box of matches under a patient's pillow ! It surprised me to learn that he seemed more interested in such details than in the condition and treatment of the patients. Daily completion of the diet sheets was another task to which much time had to be given. An operation under a general anæsthetic was somewhat of an event, which required the authority and often the presence of the P.M.O. (a Surgeon-General). It was at that time the general custom throughout the Army that, except for the orderly officer, work ceased at 1 p.m. It was a custom which brought a good deal of criticism on our Service and I am glad that in later years it ceased to be followed by our best officers. In my opinion it was justifiable only in the tropics.

The Mess was excellent and, including I.M.S., we sat down sixty to seventy to dinner. Although our pay was only eight shillings a day we managed to get along all right. As the R.A.M.C. had only recently been formed and the new uniform not yet determined, we had no mess-kit, but wore blue jumpers and overalls with a broad red stripe both at work and in Mess.

(Incidentally when the uniform was ultimately decided on, it was by no means universally popular. Many had hoped for royal blue or red facings, but many Armies have adopted cherry as the colour for their medical services.)

After a "passing-out" examination we were posted to various units then being mobilized. I joined a Bearer Company which, with an entirely separate Field Hospital, comprised the medical units of an Infantry Brigade. Before leaving the port of embarkation, the unit was inspected by a General Officer of our own Service who in his address surprised us by stressing the importance of not robbing the dead!

We sailed from Southampton for the Cape on January 4, 1900.

During the voyage lectures were given to the troops on anti-typhoid inoculation, then in its infancy, and all volunteers were given one dose.

After disembarking at Capetown we entrained for Orange River where the brigade assembled and remained some weeks. Of that period I only remember two incidents—a huge swarm of locusts which destroyed all vegetation in its path, and a visit from Lord Kitchener who had recently come from the Sudan to become Chief of Staff to the Commander-in-Chief, Lord Roberts.

The transport of our unit included seven ambulance wagons, each drawn by eight mules, and we were very disappointed when told by Lord Kitchener that owing to inability to provide sufficient forage for the mules, five of the ambulances would have to be left behind. My Commanding Officer pointed out that two ambulance wagons would be insufficient to transport the sick, but was told there wouldn't be many sick—a forecast which unfortunately did not prove accurate.

The function of a Bearer Company on the march was to transport the sick and wounded and hand them over to the field hospital on arrival at the next camp—a most unsatisfactory system which ended after the war with the adoption of the field ambulance.

We ultimately marched across the frontier of what was then the Orange Free State to a place called Ramdam where, within a few hours, an enormous mass of troops, including French's Cavalry Division, assembled from all directions, and in the evening Lords Roberts and Kitchener rode into camp. That was a thrill and we realized for the first time that we were taking part in a highly important operation.

No General Officer of my time won the esteem and affection of his troops to the same extent as Lord Roberts and they loved seeing him riding among them sitting his horse like a man of 30.

At that time he was approaching 70, had recently lost his only son (also a V.C.) killed in Natal, and had been called to direct a campaign which till then had mainly consisted of a series of reverses. In a few weeks the whole situation was changed—Kimberley was relieved, Cronje and his force surrendered at Paardeburg and Blomfontein was occupied. After the Paardeburg surrender a number of us were sent into the Boer Camp to dress the wounded. It was the first time I saw deep dug-outs and difficulty was experienced in getting out some of the more serious cases.

Cronje had put up a stubborn defence and it was during this period that the

enteric outbreak first made its appearance, to become much more extensive at Blomfontein a few weeks later.

Shortly after the fall of Paardeburg I was transferred to a Mounted Infantry Battalion with which I remained till the capture of Pretoria where, as a cheery but much-reduced band of bearded warriors, we rode past Lords Roberts and Kitchener in the main square of the capital.

Up to the time of the typhoid epidemic the medical arrangements had worked well, and the failure to deal adequately with the outbreak was a grievous disappointment to all R.A.M.C. officers serving in South Africa. This feeling was not appeased when, after the "scandal" became known at home, medical equipment of all kinds arrived from England. It was felt that with more foresight on the part of the military and medical authorities, such equipment should have been made available in the country in the earlier stages of the war.

Memories of that outbreak and the suffering and losses resulting therefrom make one wonder whether the Army realizes the debt it owes to Wright, Leishman and their successors at Millbank for protecting it from one of the greatest scourges that could inflict an army in the field.

One of my liveliest recollections of the South African War is that of the great fighting qualities of the Boer Commandos. As Mounted Infantry they were, I should think, unsurpassed, and, for example, the way in which they harassed our columns on the march was as efficient as it was unpleasant.

The period after the Boer War was to my mind the most important in the development of the Corps. For the striking improvements then brought about we are mainly indebted to two men: Mr. R. B. Haldane (afterwards Lord Haldane), Secretary of State for War, and Sir Alfred Keogh, Director-General. To their administrative genius and close co-operation the Corps owes much. Among the changes introduced during their period of office were: Establishment of the R.A.M. College, Millbank, and the Army School of Hygiene, Aldershot; senior officers' courses and appointments of consultants and specialists; formation of the Territorial Medical Service; establishment of departments of Hygiene and Pathology at the War Office with specialists in these subjects on the Staffs of the various Commands; extension and re-organization of the Nursing Service, and alterations in the Field Medical Organization.

It would be difficult for anyone who did not serve before that period to realize what a notable effect these changes had on the Corps and on the individual officer. The standard of professional work as well as the organization and equipment of our hospitals were markedly raised; our association with the civil profession (among whom Sir Alfred Keogh was held in high esteem) became closer, our position vis-a-vis the other branches of the Army was strengthened, and the Nursing Service which had been small and, to some extent, administrative in character, was re-organized into that great service which has since won such distinction in two world wars.

For Captains, the principal change was, of course, the introduction of the Senior Officers' Course and specialization, and it is a curious fact that a number

of them were against the latter when first proposed. There was also much criticism of the schemes of accelerated promotion based on the result of the examination, as it was felt that officers holding certain appointments before the course held an undue advantage. This part of the scheme was discontinued some years later.

I suppose most people will now agree that specialization has more than justified itself, indeed it would be difficult to visualize the Service without it, and it is probably true to say that the reputation of the Corps in any Station depends more on the medical, surgical and gynaecological specialists than on any of their brother officers of whatever rank. I well remember the satisfaction I felt when, on at least two occasions, Commanders-in-Chief came to my room at the War Office to express appreciation of the splendid "medical teams" in their Commands.

It is curious that so far as I remember the Haldane-Keogh developments did not include the provision of a dental service, more especially as the lack of dental surgeons was seriously felt in South Africa. I regret to think of the number of unnecessary extractions one was forced to carry out (and had carried out on oneself) during that campaign. The formation of The Army Dental Corps many years later was one of the most important developments in the Army Medical Services in recent times, though I regret it was not organized as a special branch of the R.A.M.C. Its success is a tribute to the zeal and efficiency of those dental officers who supervised its growth in the early days of its existence.

The developments to which I have been referring proved their worth in the first world war when, especially on the western front, the medical services reached a high state of efficiency. It may be claimed that no troops of any nation had ever before been so well looked after in the field, and the knowledge that, if wounded, they would be well cared for played an important part in maintaining their morale in spite of grievous casualties and extreme discomfort.

Although its success in the war was generally acknowledged, it was disappointing to find on the conclusion of hostilities that the Corps was unpopular in many of the medical schools, with the result that recruiting of young officers fell to a very low level. One of the principal causes for this was, I think, the fact that during the war almost all regular officers including specialists were allotted administrative tasks, the professional work being done almost entirely by T.C. officers. This left the impression that the R.A.M.C. was primarily a Corps of Administrators and for a young man who had just spent five years of hard work in qualifying as a doctor, a career which had been pictured to him as mainly administrative held no attractions.

The relative proportion of officers employed in administrative, as distinct from professional, work is one of the main criticisms of the Corps made by our civilian brethren. Our work in peace differs from that in war more than in any other branch of the Service. In peace we are primarily a corps of doctors; in war, with the civil profession to draw upon, a large proportion of our regular officers have of necessity to become administrative though I have always felt that this should not apply to the majority of our specialists.

Twice in my lifetime the Corps has been suddenly called on to expand to more than twenty times its normal strength, and the successful manner in which it has organized and administered that huge force is one of its greatest achievements. Unfortunately it is not an achievement which is fully appreciated either by the profession or the public, though the late Lord Moynihan, when Chairman of the Army Medical Advisory Board, used to say that as a preparation for war the training of administrators was more important than the training of surgeons because a sufficient number of the latter would always be available.

But the two functions are not incompatible. A keen doctor can, in time of peace, prepare himself for war without losing interest in his professional work and at the termination of hostilities can and should return to that work on the first opportunity.

Another subject of criticism is the admittedly large number of Forms and Returns required in the Army. I am sure no one dislikes them more than the R.A.M.C. officer who has to furnish them. Many of our best officers have tried to reduce them but without much success mainly because so many of them are required to furnish information demanded by others, e.g. the Annual Report on the Health of the Army for submission to Parliament. Anyone who can bring about a diminution in these encumbrances would be a real Corps benefactor.

I'm afraid it must be admitted that about the time I joined, many of our senior officers were not efficient, nor is this to be wondered at when one remembers that they were brought up in the old regimental system. Though usually men of great personal charm, they showed little initiative or self-reliance and were slaves to regulations. The junior officers on the other hand were a grand lot who, under the new system to be introduced later, became our first specialists and helped to raise the Corps to a high standard of efficiency. It was in the years preceding the first world war that the Corps in my opinion reached its highest peace-time level of competency and well-being.

Social life in the Corps, like everywhere else, has much changed since my early days due in the main to the increased prevalence of matrimony and the advent of the motor car. It used to be thought that marriage before reaching the rank of Major was a thing to be deprecated and the delinquent was regarded by his brother officers with ill-disguised pity. This somewhat harsh view was later modified to the wise precept that no officer should marry till he had completed his first foreign tour.

Sport, especially hunting and shooting, was indulged in much more frequently than is now the case, and polo had not yet become a game confined to men of wealth. Many of our officers played it though I never attained an ambition to play in a wholly R.A.M.C. team.

The internal combustion engine has, I fear, replaced the horse and the pony for the majority of Army officers, and tall stories in the Mess are now more likely to be concerned with shooting eagles on the golf course than shooting snipe or duck on the marshes.

The training of "other ranks" has improved out of all recognition, though I used to think it regrettable that much of that training had to be wasted

owing to "establishment" considerations. As a result of the latter, highly skilled technicians on reaching certain ranks had to be taken from their special work and allotted duties of a more or less routine character.

The bearing, demeanour, loyalty and reliability of our Warrant Officers and Non-Commissioned Officers have long been a source of justifiable pride and we all welcome the increased opportunities for promotion to commissioned rank which recent administrative changes have afforded them.

In time of war our N.C.O.s and men do not get the credit they deserve, and in the 1914-18 campaign were always referred to in the Press as "Red Cross Men," which they are not. This point was referred to by the then Adjutant-General (the late Sir Nevil Macready) in his work "Annals of an Active Life." He presumed that "our special correspondent" would ensure that such "pin-pricks" would be avoided in future wars, but such does not seem to have been the case.

Like every retired member of the R.A.M.C. I have followed its activities in recent years with the greatest interest. We shared with our comrades on the active list immense pleasure at the signal honour paid to our Corps by Her Majesty The Queen in becoming its Colonel-in-Chief.

Of its achievements in the recent war one can only express profound admiration, believing that never in its history has it served the nation and the Army so faithfully and so well.

Through the courtesy of the Director-General I paid a short visit to the B.L.A. last year. The visit was for me a memorable one, and I am very grateful to the D.M.S. and his Staff for the plans made for me to see as much as possible in the time available. One inevitably compared what one saw with the well remembered medical picture of the first world war, but the differences were so profound that there was really no comparison. Fewer casualties, earlier surgical interference, blood transfusion (the organization of this service was truly remarkable), penicillin and air transport, had altered the whole problem. The surgical technique appeared to have changed little, but thanks to the developments mentioned there seemed to be a complete absence of those shocked and toxic cases which were such a sad feature of the previous conflict.

It was a very real pleasure to be back in the field again with one's old Service, a little strange perhaps for the first hour or two, but after that I felt perfectly at home.

More, I believe, than any other medical service or society, the R.A.M.C. has always been a home to all who had the good fortune to serve it.

Whatever the future may hold, I hope that spirit will ever prevail.

[The Departments of Hygiene and Pathology at the War Office with specialists in these subjects on the Staffs of the various Commands came into effect in 1919.—Ed.]

Correspondence.

LORD ROBERTS MEMORIAL WORKSHOPS.

SIR,—The compassionate heart of the British public is perhaps in no sphere more surely expressed than in the Lord Roberts Memorial Workshops established and maintained by voluntary donations for the benefit of severely disabled ex-Service men.

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It was Lord Roberts' ever-constant care of the welfare of ex-Service men that inspired the development of the Workshops at the time of his death on the battlefield in 1914. Now, as then, the urgency of such an effectual and beneficent work is vital, and large funds are needed for its expansion.

I therefore confidently commend the Lord Roberts Workshops to the generous support of all and ask for liberal donations—a fitting tribute to the memory of an illustrious soldier and a token of immeasurable gratitude for the service and sacrifice of the Nation's disabled.

Every contribution sent me will be most thankfully acknowledged.

Yours faithfully,

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Admiral of the Fleet,

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London, S.W.3.

September 30, 1946.

*Hon. Treasurer, Soldiers, Sailors and
Airmens Help Society (Lord Roberts
Memorial Workshops).*

ERRATA.

Vol. LXXXVII, No. 2, August, 1946.

P. 62, General Rankin's name should be spelt as now indicated.

P. 93, line 6 from end, for "ticks" read "ties."



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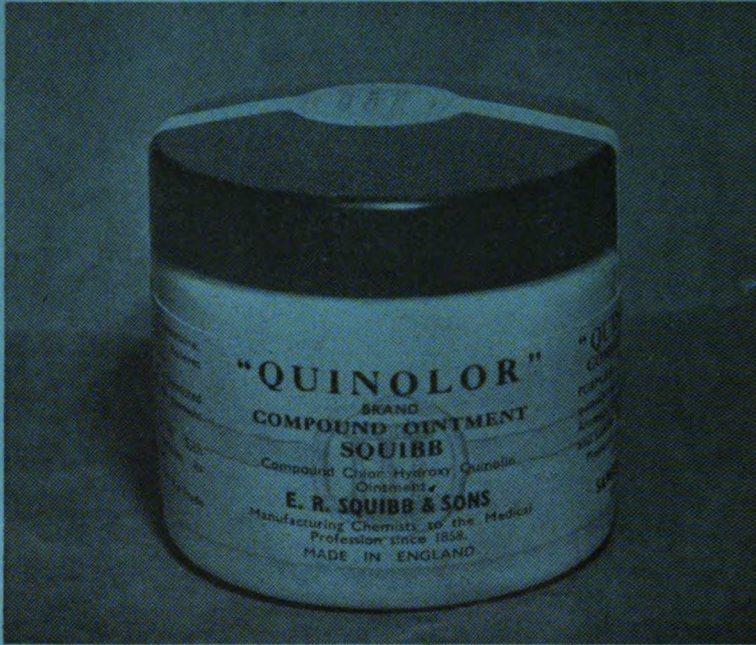
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REORGANIZATION—MEDICAL SERVICES.

BY

Major E. A. R. BERKLEY,
Royal Army Medical Corps.

[Received July 24, 1946.]

INTRODUCTION.

IN making the following comments and suggestions the writer is handicapped by being unaware of the intentions of H.M. Government with regard to defence in general and the Territorial Army in particular. However, it is clear that apart from the Regular Army and the Regular Army Reserve a "part-time" force is essential to the National Security. It is also clear that the best foundation for such a force, whatever its title may be, is the old Territorial Army whose units have played such a prominent part in the recent war. There is no doubt that the majority of Territorial Officers and Other Ranks who have survived the war, and who are still medically fit, are willing to continue service in a reorganized Territorial Army. There is no need to emphasize their active service experience as a valuable asset when the problems of reorganization and subsequent training come up for consideration.

STAFF.

(A) *Formation.*—While many of the observations and suggestions which follow would apply with equal force to other branches of the Army, the writer will confine himself to the Medical Services.

It is considered that there are a number of Territorial Officers, Royal Army Medical Corps, with administrative and staff experience in the recent war who would be willing to engage on a permanent basis under the same conditions of service as Regular Officers. The Director-General Army Medical Services should be empowered to sift this material and by careful selection appoint a

number of officers to form a staff under the Director Medical Services, Territorial Army. It is not suggested that these officers, although holding permanent full-time appointments, should be granted Regular Commissions. They should preserve their status as Territorial Officers but the Royal Warrant should be suitably amended so that a form of pension or gratuity would be available for the officer on his reaching the retiring age. The main qualifications of such officers should be :—

- (a) Mental alertness.
- (b) Varied administrative and Staff experience on active service, preferably in more than one theatre of war.
- (c) Keenness on military service.

The main advantage of forming a Staff from such officers would be that, having shared the problems and experiences of war in common with their regular colleagues, they are also aware of the problems peculiar to part-time service on a voluntary basis.

(B) *Duties.*—The duties would fall into two main groups :—

- (i) Planning and policy.
- (ii) Implementation of final plans.

In the early stages, planning and policy would occupy almost the entire working time of the Staff. The Staff should be in a position to assist the Director Medical Services, Territorial Army, in the reorganization plans put forward and be able to report and advise on conditions and problems peculiar to various localities. It is assumed that the County Territorial Associations would be retained and it is essential that efficient liaison by personal contact be maintained with these bodies and the Territorial Army Staff, especially throughout the period of planning. To enable this liaison to be effective it is suggested that a Territorial Medical Staff Officer be appointed to work in each Army Command Area in the United Kingdom. He would visit each County Territorial Association in his area and assess the medical man-power potential within the orbit of each County Association. From the information thus acquired a reasonably accurate estimate of the number of General Hospitals, Field Medical Units and Regimental Medical Officers in each case could be given. To keep these units up to strength it is suggested that, while conscription remains in force, all officers and other ranks shall be directed into the Territorial Army for a minimum period of four years at the termination of their tour of service with the Regular Army. They should be allowed to sign on as volunteers, if they so desire, at the conclusion of their compulsory Territorial Army service provided their service during these four years has been satisfactory. It would be the task of the Command Territorial Medical Staff Officer to keep in constant touch with all medical unit commanders in his area and to assist them in the problems arising out of personnel, equipment and training. By such personal contact much time can be saved and much red tape avoided as the Command Territorial Army Staff would be in direct contact with the Director Medical Services, Territorial Army.

If the United Kingdom is to maintain its place among the nations it is vital that the Army never again becomes the Cinderella of the Services and it is equally vital that the Territorial Army never again assumes the roll of poor relation to the Regular Army. To that end it is imperative that the conditions of service, standard of equipment, facilities for training and social functions shall all be of the highest order for the medical services as for the rest of the Territorial Army; otherwise the response to the call for volunteers will be negligible and achievements nil.

The implementation of final plans must of necessity be left until the final plans are completed but it is not inappropriate to indicate here a few pointers from the training and selection of personnel angles.

TRAINING AND SELECTION—OFFICERS.

It was most noticeable, especially during the latter stages of the war, that newly commissioned medical officers of the Royal Army Medical Corps were posted to units with very inadequate knowledge of regimental procedure and general military information.

A few examples are given below :—

- (i) Ignorance of the existence and purport of Part I and Part II Orders.
- (ii) Ignorance of Orderly Room procedure.
- (iii) Ignorance of their powers and responsibilities as military officers apart from purely medical duties.
- (iv) Ignorance of elementary military law and King's Regulations.
- (v) Ignorance of how to salute and whom to salute.
- (vi) Ignorance of Mess etiquette.

These and other gaps in military knowledge placed the newly commissioned medical officers at a grave disadvantage when compared with Bearer Officers, Quartermasters and Regimental Officers who had, perforce, to have served in the ranks or had Officer Cadet Training Unit experience before gaining commissions. Consequently, solecisms were frequently committed and efficiency suffered.

Another criticism lies in the selection of officers for duties with various types of units. Every field ambulance commander has had posted to his unit officers temperamentally unsuited for service in the field but who would have done well as G.D.O.s in hospitals. Conversely, many officers ideal for regimental or field ambulance duties dwelt within the comparatively comfortable shelter of hospitals. As a field ambulance commander and as a staff officer the writer experienced many examples of these types of mis-posting and, on one occasion, when commanding an Ambulance Transport in the Bay of Bengal, had two of his seven officers incapable of duty the moment the ship put to sea on account of violent and intractable seasickness. Doctors are, above all men, individualists and each one should be carefully studied before being assigned to special duties if the maximum is to be obtained from available man-power. Any fighting unit commander will confirm that a regimental medical officer who is tempera-

mentally unsuited to regimental life and the handling of men soon loses the confidence of all ranks, however good a clinician he may be, and the efficiency of the unit suffers.

It may be claimed with some justification that with the rapid and vast expansion of the armed forces, widely scattered in many parts of the world, that time did not allow for adequate elementary training and painstaking selection. That is appreciated as far as the conditions prevailing during the recent war is concerned. Now, during the period of reorganization and reconstruction, is the time when machinery can be constructed to obviate the pitfalls mentioned above.

It is suggested, therefore, that a medical officers' Officer Cadet Training Unit be formed and that fresh intakes of medical men should go through a four months' course with the status of Officer Cadets prior to receiving their commission and appearing before selection boards. The objection is of course the time lag, but it is the writer's contention that this would be "ironed out" within two years and the resulting efficiency would more than offset such a temporary disadvantage. With the cessation of conscription a modified course for volunteer Territorial Officers could be developed, but that is not of immediate concern. Even specialists should not be exempt from the Officer Cadet Training Unit as the wider the knowledge of all branches of military activity the less narrow their view when dealing with casualties from front-line units.

TRAINING AND SELECTION—OTHER RANKS.

A large number of men, having been found unsuitable for various branches of the Army seem to drift into the Royal Army Medical Corps. Men of low medical category and imperfect mental development are all too frequently found among intakes and reinforcements. Many of these unfortunate individuals are posted from unit to unit unwanted and untrainable. They are invariably relegated to menial duties which they perform with marked lack of success. The Royal Army Medical Corps is, or should be, a corps of specialist tradesmen just as much as the Royal Electrical Mechanical Engineers, or any other technical corps. It is true that useful work can be done by men of low medical category provided that they are mentally suited to medical and surgical tasks. It is essential, however, that other ranks for service with field medical units should be of tough fibre, physically and mentally, in addition to having aptitude for, and interest in, their work. Personal and painstaking selection is the only solution to this problem. On the other hand there are many men in Infantry and Royal Artillery Regiments ideal in every way, including inclination, for service with the Royal Army Medical Corps. The machinery for transferring a man from one branch of the Service to another is far too cumbersome and is in urgent need of overhaul. To give one example of many which might be quoted is that of a highly qualified St. John Ambulance man who found himself a gunner and it required fifteen months of persistent and untiring effort to secure his transfer to the Royal Army Medical Corps in which he received rapid and well-deserved promotion.

It will be realized that the criticisms detailed above are not made in a destructive spirit. To summarize, criticisms based on personal experience during the recent war are made on the training and selection of personnel of the Royal Army Medical Corps and the remedies suggested are :—

- (a) The formation of a Staff of Territorial Army Officers in a permanent engagement.
- (b) The formation of an Officer Cadet Training Unit for potential medical officers.
- (c) An overhaul of the machinery for the selection of personnel for the Royal Army Medical Corps.
- (d) An overhaul of the machinery for the posting of all ranks of the Royal Army Medical Corps to the various types of units in the Army.

SYRINGE CONTAMINATION FOLLOWING INTRAMUSCULAR AND SUBCUTANEOUS INJECTIONS.

BY

Major R. R. HUGHES, M.D., M.R.C.P.

Royal Army Medical Corps.

[Received July 29, 1946.]

FOR many years it had been customary to give a series of intravenous injections of a drug such as neoarsphenamine with the same syringe, merely rinsing the syringe with antiseptic and distilled water before passing on to the next patient. Largely as a result of investigation of cases of postarsphenamine jaundice it has become recognized in recent years that a syringe which has been used for an intravenous injection may be grossly contaminated; such a syringe must be adequately sterilized before re-use.

The same applies to intramuscular injections. Since penicillin has become so widely used it has now become apparent that there is a "postpenicillin jaundice" analogous to postarsphenamine jaundice which is conveyed by means of syringes contaminated during intramuscular injection. Cases of postpenicillin jaundice have been reported by Turner (1945), Howells and Kerr (1946), Laird (1946), and Hughes (1946). Cases of jaundice have been reported after the intramuscular injection of gold salts for rheumatoid arthritis by Hartfall, Garland and Goldie (1937). Kulchar and Reynolds (1942) reported cases after bismuth injections.

The present paper describes experiments which demonstrate that a syringe which has been used to give an intramuscular or subcutaneous injection is frequently contaminated with blood from the patient; a simple method by which contamination may be avoided is also described. A preliminary report on this work was published by Hughes (1946).

DEMONSTRATION OF THE RED BLOOD CELLS OF THE PATIENT IN THE SYRINGE USED FOR AN INTRAMUSCULAR OR SUBCUTANEOUS INJECTION.

General Principles of the Method Used.—Faulty technique of sterilization or injection might lead to syringe contamination but it was felt that this could not be the usual explanation of these cases of jaundice and that the traditional method of giving a series of injections from one syringe (using a fresh needle for each patient) might well be at fault. Further investigations confirmed this view and demonstrated the frequent presence of blood in the syringe after a single injection had been given.

In the following experiments an injection of 1.0 c.c. of normal saline was given into the thigh or buttock muscles or into the subcutaneous tissues of

the abdominal wall; the needle was then withdrawn from the tissues, immediately removed from the syringe and successive drops of saline from the syringe were examined microscopically for red blood cells.

Syringes and Needles Used.—These were of standard Army pattern as issued to military hospitals. Syringes: 2 c.c., 5 c.c., 10 c.c., and 20 c.c. glass and metal syringes with the standard "Army" (or "Sima") fitting were used. This fitting is considerably larger than the "Record" fitting commonly used in civilian medical practice in England. For a few of the experiments an all-glass "Army" fitting 2 c.c. syringe was used. Needles: Sizes 19, 21 and 23 Birmingham English Standard Wire Gauge needles were used, lengths 50 mm., 38 mm. and 25 mm. respectively.

Injection of Saline into the Contracted Quadriceps.

Number of red blood cells found in the nozzle of the syringe after an injection.

TABLE I.—CONTRACTED QUADRICEPS (27 PATIENTS).

Technique: The patient was arranged in a lying position with the quadriceps contracted by pressing the back of the knee firmly on to the couch. The needle and syringe were filled with sterile normal saline (0.85 per cent sodium chloride), the needle (with the syringe attached) was inserted into the outer side of the thigh about the centre of the vastus externus and 1 c.c. of saline injected. The needle was then immediately withdrawn from the muscle, removed from the syringe and succeeding drops of saline from the nozzle of the syringe were examined microscopically for red blood cells in a Neubauer counting chamber; the number of cells in the whole ruled area (0.9 c.mm.) being counted.

Number of experiments	Syringe	Needle gauge	Volume injected	Number of R.B.C. in 0.9 c.mm. of saline			
				Drop 1	Drop 2	Drop 3	Drop 4
1	2 c.c.	23	1 c.c.	3	0	0	
1	2 c.c.	23	1 c.c.	2	0		
1	2 c.c.	23	1 c.c.	57	0		
4	2 c.c.	23	1 c.c.	None			
1	2 c.c.	23	1 c.c.	9	0		
3	5 c.c.	23	1 c.c.	None			
1	5 c.c.	23	1 c.c.	4	0		
1	10 c.c.	23	1 c.c.	163	6	0	
1	10 c.c.	23	1 c.c.	80	0		
3	2 c.c.	21	1 c.c.	None			
1	2 c.c.	21	1 c.c.	72	27	0	
1	2 c.c.	21	1 c.c.	8	1	0	
1	5 c.c.	21	1 c.c.	2	0	0	
1	5 c.c.	21	1 c.c.	None			
1	10 c.c.	21	1 c.c.	4	0		
1	10 c.c.	21	1 c.c.	None			
1	2 c.c.	19	1 c.c.	204	4	2	0
1	2 c.c.	19	1 c.c.	3	2	0	
1	10 c.c.	19	1 c.c.	51	33	3	0
1	10 c.c.	19	1 c.c.	243	19	13	0

TABLE II.—RELAXED QUADRICEPS (27 PATIENTS).

Technique : The technique here was precisely the same as in the previous experiments except that the quadriceps was maintained in a completely relaxed state during the injection.

Number of experiments	Syringe	Needle gauge	Volume injected	Number of R.B.C. in 0.9 c.mm. of saline			
				Drop 1	Drop 2	Drop 3	Drop 4
2	2 c.c.	23	1 c.c.	None			
2	10 c.c.	23	1 c.c.	None			
9	2 c.c.	21	1 c.c.	None			
1	2 c.c.	21	1 c.c.	1	0		
7	10 c.c.	21	1 c.c.	None			
1	10 c.c.	21	1 c.c.	2	0		
1	2 c.c.	21	1 c.c.	243	18	0	
3	2 c.c.	19	1 c.c.	None			
2	10 c.c.	19	1 c.c.	None			
1	10 c.c.	19	1 c.c.	45	9	0	

TABLE III.—CONTRACTED BUTTOCK MUSCLES (30 PATIENTS).

Technique : The patient was arranged standing with his weight on one leg and the buttock muscles of that side firmly braced ; the other leg was slightly flexed at the hip and knee joints and externally rotated a little, thus leaving the buttock muscles on that side relaxed. The injection of saline was given deeply into the muscles of the upper and outer quadrant of the buttock which was firmly contracted, the needle was then withdrawn from the tissues, removed from the syringe and the R.B.C. counted as before.

Number of experiments	Syringe	Needle gauge	Volume injected	Number of R.B.C. in 0.9 c.mm. of saline			
				Drop 1	Drop 2	Drop 3	Drop 4
1	2 c.c.	21	1 c.c.	81	4	0	
1	2 c.c.	21	1 c.c.	5,832	57	7	0
7	2 c.c.	21	1 c.c.	None			
10	10 c.c.	21	1 c.c.	None			
1	10 c.c.	21	1 c.c.	3	0		
4	10 c.c.	21	1 c.c.	1	0		
1	10 c.c.	21	1 c.c.	97	12	1	0
1	10 c.c.	21	1 c.c.	378	81	25	3
1	20 c.c.	21	1 c.c.	None			
1	20 c.c.	21	1 c.c.	3	0		
1	20 c.c.	21	1 c.c.	7	0		
1	20 c.c.	21	1 c.c.	1	0		

TABLE IV.—RELAXED BUTTOCK MUSCLES (30 PATIENTS).

Technique: The patient was arranged as in previous experiment but the injection was now given into the upper and outer quadrant of the relaxed buttock.

Number of experiments	Syringe	Needle gauge	Volume injected	Number of R.B.C. in 0.9 c.mm. of saline			
				Drop 1	Drop 2	Drop 3	Drop 4
12	2 c.c.	21	1 c.c.	None			
1	2 c.c.	21	1 c.c.	2	0		
2	2 c.c.	21	1 c.c.	5	0		
10	10 c.c.	21	1 c.c.	None			
3	10 c.c.	21	1 c.c.	1	0		
1	10 c.c.	21	1 c.c.	4	0		
1	10 c.c.	21	1 c.c.	56	3	0	

Comments.—From the results of the above experiments the following conclusions can be drawn :—

(1) The syringe was contaminated with blood from the patient in 39 (34 per cent) out of a total of 114 injections given.

(2) Contamination was more frequent and more severe when the injection was given into a muscle in a state of active contraction than when the injection was given into a relaxed muscle. Thus contamination occurred in 27 (47 per cent) out of 57 injections given into contracted muscle and up to 5,832 red cells in 0.9 c.mm. of saline were found in the first drop from the nozzle of the syringe ; with the muscle relaxed contamination occurred in only 12 (21 per cent) of 57 injections and the maximum number of red cells found was 243 in 0.9 c.mm. of saline.

(3) The degree of contamination diminished with each succeeding drop of saline examined ; this suggests that contamination was confined to the drop of saline left on the tip of the nozzle of the syringe when the needle was removed and that the syringe contents were not generally contaminated.

(4) Contamination of the syringe occurred with all three sizes of needle used.

It should be noted that in this series of experiments the plunger of the syringe was not withdrawn after the insertion of the needle to ensure that the point was not within the lumen of a blood-vessel. Such a procedure would obviously much increase the possibility of contamination.

Injection of Saline into the Subcutaneous Tissues of the Anterior Abdominal Wall.

TABLE V.—NUMBER OF RED BLOOD CELLS FOUND IN THE NOZZLE OF THE SYRINGE AFTER A SUBCUTANEOUS INJECTION.

Technique : The patient was arranged lying relaxed upon a couch. A fold of skin over the anterior abdominal wall was picked up between the finger and thumb, the needle was inserted into the subcutaneous tissues and the fold of skin then released. The injection was then given. The needle was withdrawn from the tissues, removed from the syringe and succeeding drops of saline from the nozzle of the syringe were examined for red blood cells in a Neubauer counting chamber as in the previous experiments.

<i>Experiment</i>	<i>Needle gauge</i>	<i>Volume injected</i>	<i>No. of R.B.C. 0.9/c.mm. in first drop of saline from nozzle of the syringe</i>
25	23	1 c.c.	None
1	23	1 c.c.	Too numerous to count
1	23	1 c.c.	4
1	23	1 c.c.	2
1	23	1 c.c.	378
1	23	1 c.c.	243

Comments.—Thus it can be seen that syringe contamination may occur after subcutaneous injection just as after intramuscular injection ; in the above series contamination occurred in 5 out of a total of 30 injections given. One point is worthy of further comment—in each of the above instances of

contamination (except one) appreciable skin bleeding was noted on withdrawal of the needle from the tissues. The possible importance of bleeding from the puncture was not appreciated in the earlier experiments and its incidence was not noted ; experiments described later in this paper suggest that such bleeding may be an important factor in the causation of syringe contamination.

MECHANISM PRODUCING SYRINGE CONTAMINATION DURING SUBCUTANEOUS AND INTRAMUSCULAR INJECTIONS.

Experiments have shown three possible mechanisms which, either separately or together, might account for the contamination of the syringe ; these are (1) back pressure forcing fluid from the tissues into the needle, (2) spread of blood by diffusion from the tip of the needle towards the syringe, and (3) suction when removing the needle from the syringe aspirating the needle contents back on to the nozzle of the syringe.

(1) BACK-PRESSURE FROM THE TISSUES.

It has been recognized for some time by the dental profession that when injecting local anæsthetic under pressure into the fibrous tissue of the gum, fluid is forced back and contaminates the syringe. Hence it is customary for dentists to use a clean syringe for each different part of the gum if any evidence of infection is present.

Again, when giving an intramuscular injection with a small syringe it is not uncommon to note that the plunger returns for a small distance when the pressure is released at the end of the injection. To demonstrate this more accurately a series of 12 intramuscular injections of 1 c.c. of normal saline were given into the contracted quadriceps by means of a 1 c.c. vaccine syringe. In two instances fluid was noted to return, to approximately the volume of 0.2 c.c. and 0.04 c.c.

Further experiments were carried out in which saline was injected intramuscularly or subcutaneously and immediately the injection was completed the needle was switched (by means of a two-way tap) to a manometer which consisted of a 1 c.c. pipette graduated in 0.01 c.c. Saline was noted to return from the tissues in a number of the experiments, as is shown in Tables VI and VII.

TABLE VI.—RETURN OF FLUID FROM TISSUES AFTER AN INTRAMUSCULAR INJECTION.

Technique : The patient was arranged lying upon a couch with the right thigh muscles braced or relaxed as required. A syringe was taken, connected to a needle by means of a two-way tap and the side tube of the tap connected to a 1 c.c. pipette (graduated in 0.01 c.c.) by means of a short length of rubber tubing. The syringe was filled with saline and the pipette filled to a convenient height from the syringe. The needle was then inserted into the vastus externus and the pipette was held vertically so that the fluid level was 0.05 c.c. above the point of the needle in the tissues (the reason for this is discussed later) ; the saline was then injected. Immediately the injection was given the two-way tap was turned to connect the needle with the pipette, the volume of fluid returned from the tissues into the pipette was then noted.

<i>No. of experiments</i>	<i>Needle gauge</i>	<i>Muscle tone</i>	<i>Volume injected</i>	<i>Volume of fluid returned from tissues</i>
1	21	Relaxed	1 c.c.	0.025 c.c.
1	21	Relaxed	1 c.c.	0.100 c.c.
2	21	Relaxed	1 c.c.	None
1	21	Relaxed	1 c.c.	0.060 c.c.
1	21	Relaxed	1 c.c.	0.050 c.c.
1	21	Relaxed	1 c.c.	0.020 c.c.
1	21	Relaxed	1 c.c.	0.150 c.c.
1	21	Relaxed	1 c.c.	0.030 c.c.
1	21	Relaxed	1 c.c.	0.010 c.c.
1	21	Contracted	1 c.c.	0.015 c.c.
2	21	Contracted	1 c.c.	0.010 c.c.
1	21	Contracted	1 c.c.	0.020 c.c.
3	21	Contracted	1 c.c.	None
1	21	Contracted	1 c.c.	0.005 c.c.
1	21	Contracted	1 c.c.	0.040 c.c.
1	21	Contracted	1 c.c.	0.065 c.c.
2	21	Relaxed	5 c.c.	None
1	21	Relaxed	5 c.c.	0.030 c.c.
1	21	Relaxed	5 c.c.	0.040 c.c.
1	21	Contracted	5 c.c.	0.028 c.c.
1	21	Contracted	5 c.c.	0.060 c.c.
1	21	Contracted	5 c.c.	0.010 c.c.
1	21	Contracted	5 c.c.	0.025 c.c.
1	21	Contracted	5 c.c.	0.350 c.c.
1	21	Contracted	5 c.c.	0.210 c.c.

TABLE VII.—RETURN OF FLUID FROM THE TISSUES AFTER A SUBCUTANEOUS INJECTION.

Technique: The syringe, needle, two-way tap and manometer were used as in the previous experiment. The patient was arranged lying upon a couch and the needle inserted into the subcutaneous tissues of the anterior abdominal wall; the injection was then made, the needle was immediately switched to the manometer by means of the two-way tap and the volume of fluid returned noted as before.

<i>No. of experiments</i>	<i>Needle gauge</i>	<i>Volume injected</i>	<i>Volume of fluid returned from tissues</i>
2	23	1 c.c.	0.03 c.c.
11	23	1 c.c.	None
3	23	1 c.c.	0.04 c.c.
3	23	1 c.c.	0.01 c.c.
1	23	1 c.c.	0.02 c.c.
1	23	5 c.c.	0.10 c.c.
1	23	5 c.c.	0.09 c.c.
1	23	5 c.c.	0.20 c.c.
2	23	5 c.c.	None

Comment.—In the above experiments sufficient fluid was noted to return from the tissues after both subcutaneous and intramuscular injections to contaminate the syringe contents.

Various criticisms of these results are possible. First, the return of saline might to some extent be due to the surface tension in a narrow bore tube.

This possibility had been appreciated and experiments had been carried out with the pipettes used above to determine the height of saline which could be supported by capillary attraction in each tube. The results obtained were as follows.

TABLE VIII.—HEIGHT OF THE COLUMN OF NORMAL SALINE SUPPORTED BY CAPILLARY ATTRACTION IN A 1 C.C. PIPETTE.

Technique : The syringe, needle, two-way tap and 1 c.c. pipette were arranged as for the last experiment. The pipette was filled to a convenient height with saline from the syringe and the tip of the needle was placed in a beaker of normal saline. The height of the fluid in the pipette above the level of the saline in the beaker was noted.

Needle gauge	<i>Height of the saline in the pipette above the surface of the saline in the beaker</i>		
	<i>Pipette A</i>	<i>Pipette B</i>	<i>Pipette C</i>
23	None	0.030 c.c.	0.010 c.c.
21	0.015 c.c.	0.025 c.c.	0.010 c.c.
19	0.015 c.c.	0.030 c.c.	0.015 c.c.

As is described above, after the needle had been inserted into the tissues the pipette was placed in a vertical position and arranged so that the fluid level in the pipette was 0.05 c.c. above the point of the needle ; hence any return of fluid as a result of capillary attraction was avoided.

Secondly the conditions of the experiment are not comparable with those when an ordinary injection is given. However, as can be seen from the experiments with a vaccine syringe actual displacement of the plunger can occur at the end of the injection when a small and lightly built syringe is used. In addition it is quite possible that fluid can return from the tissues to the syringe without displacing the plunger at all, but merely displacing further fluid through leaky joints in the syringe.

(2) SPREAD OF BLOOD BY DIFFUSION FROM THE NEEDLE POINT TOWARDS THE SYRINGE.

If a syringe with the needle attached is filled with saline and the tip of the needle is contaminated with blood, in certain circumstances the blood will spread along the needle towards the syringe. This was demonstrated by the following experiments.

TABLE IX.—SPREAD OF RED BLOOD CELLS BY DIFFUSION FROM THE NEEDLE POINT TOWARDS THE SYRINGE.

Technique : The syringe and needle were filled with fluid, then laid upon the bench in a horizontal position and the tip of the needle was contaminated with a drop of blood ; after a certain interval of time the needle was cut off at the socket with wire cutters, the socket was removed from the syringe and the drop of fluid from the nozzle of the syringe was examined microscopically for red blood cells. A fresh gauge 23 needle was used for each experiment.

Section 1. Fluid in the syringe—normal saline.

Blood citrated as for Westergren method of sedimentation rate.

Time interval between application of R.B.C. and cutting the needle *Number of R.B.C./0.9 c.mm. of saline in the drop on the nozzle of the syringe*

	<i>Expt. 1</i>	<i>Expt. 2</i>	<i>Expt. 3</i>	<i>Expt. 4</i>	<i>Expt. 5</i>
15 secs.	None	None	None	None	None
30 secs.	None	None	None	None	None
45 secs.	None	4,608	396	None	None
60 secs.	780	None	None	13,392	13,392
60 secs.	None	None	8	None	None
60 secs.	None	1,728	None	192	45
60 secs.	None	None	3	None	None
60 secs.	None	None	None	4	None

Section 2. Fluid in the syringe—normal saline.

Blood oxalated (ammonium potassium oxalate mixture).

60 secs.	None	None	None	None	None
300 secs.	None	None	None	None	None
600 secs.	None	56	7	37	18

Section 3. Fluid in the syringe—normal saline.

Blood fresh (from finger stab).

60 secs.	None	None	None	None	None
60 secs.	None	None	None	None	None
60 secs.	None	None	1	None	None
60 secs.	None	None	None	None	2

Section 4. Fluid in the syringe—T.A.B. (Glaxo).

Blood—citrated (Westergren).

60 secs.	5	4	10	3
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Section 5. Fluid in the syringe—T.A.B. (Glaxo).

Blood—fresh.

60 secs.	None	4	3	5
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Comment.—It can thus be seen that citrated blood will spread fairly rapidly along a needle filled with normal saline, oxalated blood spreads more slowly and fresh blood still more slowly. Similarly with a needle containing T.A.B.: fresh blood appears to spread more slowly than citrated blood (if one can draw any conclusions from such a small number of experiments). Such experiments as these are limited by the necessity for using a fluid which does not hæmolyse red blood cells; blood may spread along the needle with many of the drugs commonly used but hæmolysis prevented detection by the present method.

The importance of this mechanism in the production of syringe contamination is probably small as it is usual to remove the needle from the syringe immediately the injection has been given and hence there is little time for diffusion of blood to occur.

(3) ASPIRATION OF THE NEEDLE CONTENTS WHEN THE NEEDLE IS REMOVED FROM THE SYRINGE.

That this actually occurs can be very simply demonstrated. A syringe with needle attached is filled with fluid and the plunger pressed until a small drop of fluid appears at the point of the needle, if the needle is then removed from the syringe the drop is immediately sucked back into the needle.

Gross contamination of the syringe by this mechanism is demonstrated by the following experiments :—

TABLE X.—ASPIRATION OF THE NEEDLE CONTENTS WHEN THE NEEDLE IS REMOVED FROM THE SYRINGE.

Technique : The syringe and needle were filled with normal saline and placed horizontally on the bench. A tiny drop of citrated blood was placed on the point of the needle with a Pasteur pipette, the needle was immediately removed from the syringe and the drop of saline left on the nozzle of the syringe was examined microscopically for red blood cells.

Needle gauge	Number of R.B.C. /0.9 c.mm. of saline in drop on nozzle of syringe							
	Expt. 1	Expt. 2	Expt. 3	Expt. 4	Expt. 5	Expt. 6	Expt. 7	Expt. 8
23 (25 mm. long)	105	TNTC	TNTC	2,736	2,016	TNTC	TNTC	36,576
21 (38 mm. long)	TNTC	14,544	TNTC	3,888	TNTC	None	TNTC	43
20 (50 mm. long)	38,880	TNTC	None	2,088	None	None	None	None
19 (50 mm. long)	70,560	26,784	TNTC	TNTC	None	None	None	None
	TNTC—too numerous to count.							

Comment.—It can thus be seen that if any blood remains on the tip of the needle when it is withdrawn from the tissues the chances of it being deposited on the nozzle of the syringe when the needle is removed are very high indeed ; the chances are probably higher with the smaller sizes of needle in common use.

**MECHANISM BY WHICH SYRINGE CONTAMINATION OCCURS DURING
SUBCUTANEOUS AND INTRAMUSCULAR INJECTIONS.**

From the above experiments it is now clear that in a high proportion of cases a syringe is contaminated after a single intramuscular or subcutaneous injection has been given (even when the volume injected is as small as 1 c.c.). The investigations suggest that contamination occurs as follows : A small amount of fluid is forced back into the needle at the end of the injection or traces of blood are left on the tip of the needle when it is withdrawn from the tissues. This blood diffuses slowly along the needle towards the syringe ; on removing the needle from the syringe the needle contents are aspirated leaving a contaminated drop on the nozzle of the syringe. This drop contaminates the next injection given. It seems possible that occasionally (and particularly when a large quantity of fluid is injected) fluid is actually forced from the tissues into the syringe and directly contaminates the syringe contents.

RESULTS OF FURTHER EXPERIMENTS WITH "RECORD" FITTING SYRINGES OF CIVILIAN PATTERN.

All the previous experiments were carried out with standard "Army" fitting syringes. This "Army" fitting refers to the nozzle of the syringe which fits into the socket of the needle; it is very much broader than that of the "Record" fitting syringe used so extensively in civilian practice in England, the needle socket fits more perfectly as a rule and extends for a greater distance over the nozzle of the syringe, hence producing a more stable and watertight joint.

In view of the difference in fitting of the two types of syringe it was thought possible that different results might be obtained if some of the above experiments were repeated with "Record" fitting syringes. Three series of experiments were carried out and this hypothesis was confirmed.

TABLE XI.—VOLUME OF FLUID ASPIRATED ON REMOVAL OF THE
NEEDLE FROM THE SYRINGE.

Technique: An 0.2 c.c. micropipette (graduated in 0.001 c.c.) was connected by means of a short length of rubber tubing to a female adaptor of "Army" or civilian "Record" fitting as required. The pipette was then placed horizontally on a bench, a 10 c.c. syringe containing normal saline was connected to the adaptor and the tubing and pipette filled to a convenient level with saline from the syringe. The syringe was then disconnected from the adaptor and the fluid level in the pipette fell in each experiment. The amount of fluid displaced by this method using a variety of syringes of both "Army" and "Record" fitting was noted.

Syringe	Fitting	Rate of removal of syringe from adaptor	Volume of fluid aspirated (c.c.)				
A	"Record"	Slowly	0.024	0.020	0.024	0.034	0.024
			0.024	0.026	0.022	0.024	0.028
			0.014	0.032	0.022	0.030	0.020
		Quickly	0.002	0.002	0.001	0.003	0.003
			0.003	0.003	0.002	0.002	0.003
			0.002	0.002	0.002	0.003	0.003
B	"Record"	Slowly	0.017	0.015	0.021	0.020	0.021
			0.020	0.019	0.017	0.017	0.019
			0.022	0.021	0.024	0.022	0.021
		Quickly	0.003	0.002	0.001	0.001	0.001
			0.001	0.002	0.002	0.002	0.002
			0.002	0.003	0.003	0.002	0.002
X	"Army"	Slowly	0.057	0.076	0.083	0.085	0.084
			0.056	0.083	0.084	0.082	0.077
			0.077	0.076	0.080	0.056	0.077
		Quickly	0.010	0.008	0.006	0.007	0.005
			0.015	0.013	0.005	0.012	0.008
			0.009	0.012	0.013	0.006	0.006
Y	"Army"	Slowly	0.074	0.075	0.055	0.048	0.068
			0.067	0.042	0.053	0.059	0.055
			0.050	0.059	0.046	0.046	0.065
		Quickly	0.008	0.014	0.013	0.011	0.013
			0.008	0.005	0.006	0.006	0.007
			0.005	0.006	0.010	0.010	0.009

Comment.—Thus it can be seen that the amount of fluid aspirated when the needle is removed from a syringe of Army pattern is appreciably greater than with a civilian pattern syringe—a finding one would expect in view of the larger size of the Army fitting. The volume of the fluid displaced by this means was also noted to vary with the rate of removal of the syringe from the adaptor; whether this is of any practical importance in the production of syringe contamination is doubtful, this point is referred to again later.

ASPIRATION OF THE NEEDLE CONTENTS WHEN THE NEEDLE IS REMOVED FROM THE SYRINGE.

The experiments the results of which are summarized in Table X were repeated with "Record" fitting syringes and the results obtained are compared with the earlier results in the following table.

TABLE XII.—ASPIRATION OF THE NEEDLE CONTENTS WHEN THE NEEDLE IS REMOVED FROM THE SYRINGE.

Needle gauge	Needle fitting	Number of R.B.C. /0.9 c.mm. in drop on nozzle of syringe							
		Expt. 1	Expt. 2	Expt. 3	Expt. 4	Expt. 5	Expt. 6	Expt. 7	Expt. 8
23	"Army"	105	TNTC	TNTC	2,736	2,016	TNTC	TNTC	36,576
23	"Record"	None	None	None	None	30	None	None	None
21	"Army"	TNTC	14,544	TNTC	3,888	TNTC	None	TNTC	43
21	"Record"	None	None	None	None	None	None	None	None
19	"Army"	70,560	26,784	TNTC	TNTC	None	None	None	None
19	"Record"	None	None	None	None	None	None	None	None

TNTC—too numerous to count.

Comment.—It is now clear that when using a "Record" fitting syringe it is by no means frequent for red cells to be aspirated from the needle tip to the syringe when the needle is removed, certainly not nearly so frequently as when an "Army" fitting syringe is used. It is also worth noting that, despite the results of previous experiments, the rate of removal of the needle from the syringe made no difference to the negative results obtained in the present experiments; however slowly the needle was removed red cells did not reach the syringe nozzle.

DEMONSTRATION OF THE RED BLOOD CELLS OF THE PATIENT IN THE SYRINGE USED FOR AN INTRAMUSCULAR OR SUBCUTANEOUS INJECTION.

Finally, a further series of saline injections were given into the actively contracted buttock muscles and the drop of saline left on the nozzle of the syringe on removal of the needle was examined microscopically for red blood cells as in the previous experiments. "Record" fitting syringes were used but apart from this the technique was precisely the same as in the experiments with "Army" fitting syringes described in the first part of this paper. Contamination of the syringe was again frequently found as can be seen from the following results.

TABLE XIII.—NUMBER OF RED BLOOD CELLS FOUND IN THE NOZZLE OF THE SYRINGE AFTER AN INJECTION INTO THE CONTRACTED BUTTOCK MUSCLES (50 PATIENTS).

(Experiments with "Record" Fitting Syringes.)

Syringe	Needle gauge	Volume injected	Number of R.B.C./0.9 c.c. in first drop of saline from the nozzle of the syringe
10 c.c.	21	1 c.c.	None
(43 injections were given as above with similar negative results. The following positive results were obtained.)			
10 c.c.	21	1 c.c.	1
10 c.c.	21	1 c.c.	2
10 c.c.	21	1 c.c.	2
10 c.c.	21	1 c.c.	448
10 c.c.	21	1 c.c.	78
10 c.c.	21	1 c.c.	372
10 c.c.	21	1 c.c.	258

Comment.—Thus contamination was demonstrated when using a "Record" fitting syringe for intramuscular injections. On comparing the above results with those recorded in Table III it is seen that contamination occurred in 7 out of 50 injections (14 per cent of cases) whereas when an "Army" fitting syringe was used contamination occurred in as many as 12 out of 30 injections (40 per cent of cases). Hence contamination is more likely with a syringe of "Army" pattern than with a civilian type syringe.

A SIMPLE METHOD OF AVOIDING SYRINGE CONTAMINATION.

From the results reported above there can be no doubt that a freshly sterilized syringe should be used for each intramuscular or subcutaneous injection if this is at all possible. While there is no difficulty about this when only small numbers of injections are being given, sterilization becomes a major problem when hundreds of injections are to be given in rapid succession as in inoculation of a unit. In these circumstances large numbers of syringes would be required and the breakage rate would be in many instances high as the sterilization is done by semi-skilled staff.

Hence an attempt was made to devise a simple and reasonably efficient method of giving a series of injections from the same syringe without contamination occurring. It was found that this could be done by placing a tap between the needle and syringe and turning the tap off as soon as the injection had been given and before the needle was removed from the tissues. The details of this technique are as follows.

Technique: The syringe is filled with the solution, a two-way tap is placed on the syringe and the needle is fitted to the tap; the injection is then given into a relaxed muscle and, before the pressure on the plunger is released, the tap is turned off (the needle is now connected to the side tube of the tap and no longer to the syringe). The needle is then withdrawn from the tissues, the tap and needle together removed from the syringe and a freshly sterilized tap and needle are fitted for the next injection.

The used tap and needle can be rinsed and rapidly resterilized by boiling without the fear of breakage which is the disadvantage of sterilizing syringes by this method.

On theoretical grounds this method appears to be satisfactory ; once the tap is turned off fluid cannot return from the tissues, blood cannot spread back to the syringe and also the tap prevents contaminated material being aspirated to the syringe when the needle is removed.

The above technique was used for a series of 99 injections and when the tap was removed from the syringe the drop of fluid left on the nozzle was examined microscopically for red blood cells. In not a single instance was contamination found. Details of these investigations are given below.

TABLE XIV.—AVOIDANCE OF CONTAMINATION OF THE SYRINGE DURING AN INTRAMUSCULAR INJECTION BY USE OF A TWO-WAY TAP.

Number of injections given	Volume injected	Needle Gauge	Length	Number of contaminated syringes discovered
50	1 c.c.	22	38 mm.	None
25	1 c.c.	21	38 mm.	None
24	10 c.c.	21	38 mm.	None

Thus this technique appears to be reasonably efficient in preventing syringe contamination and is worthy of a clinical trial. It should however be noted that this technique is unsuitable for injecting a drug that must not enter a blood-vessel ; in this case the plunger must be withdrawn before injecting the drug and hence blood may enter the syringe despite the presence of the tap.

The two-way taps used in these investigations were the standard issue as used with Army fitting syringes for aspiration of chests, etc. It seems likely that a simple single tap without a side tube would work just as efficiently, but no such taps were available and this could not be investigated.

SUMMARY.

It has been shown that a single subcutaneous or intramuscular injection of 1 c.c. may lead to contamination of the syringe used. The mechanism by which this contamination occurs has been discussed.

A simple method of avoiding this contamination (without re-sterilizing the syringe after every injection) is discussed.

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A RELIABLE METHOD OF PERFORMING THE PERIDURAL ANALGESIA (P.D.A.)

BY

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THE P.D.A. method was for the first time used for the human subject by the Spanish Surgeon, Fidel Pages, in 1920, and later introduced in Italy by Dioglotti and in America for abdominal surgery. It is not generally appreciated by many surgeons because the defective technique frequently impaired the success.

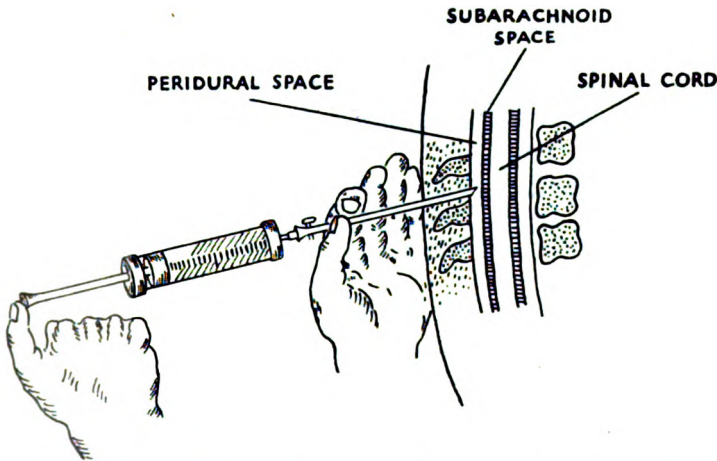


FIG. 1.—The puncture of the peridural space. The index finger and the thumb of the left hand are leading the needle. The main pressure is carried out by the thumb of the right hand on the withdrawn plunger of the syringe containing saline.

In 1936 a reliable method was elaborated in the surgical division of the University Hospital Erlangen (Germany) by Professor Otto Goetze and his assistant surgeons. Since then the P.D.A. has been used in that University Hospital for all suitable cases, e.g. abdominal and urological surgery as well as for operations on the lower extremity, genital organs and anus.

Technique (figs. 1 and 2).—After administration of a common pre-operative drug one hour before the analgesia (scopolamin-ephetonin-eucodal i.v.) a lumbar puncture needle is inserted to about one inch in the same way as for

a lumbar puncture (patient sitting). The stilette is withdrawn and a 10 c.c. syringe with saline connected to the needle. As long as the point of the needle is situated in the dense tissue of the interspinal ligaments a moderate pressure on the plunger does not cause a release of saline, but this stress is adequate to push the needle forward. At the very moment when the tip of the needle enters the peridural space which is occupied by loose areolar tissue, the saline is released and the plunger moves quickly and easily forward. In order to ensure that the subarachnoid space has not been entered, an aspiration test is advisable. An inadvertent puncture of the dura practically never occurs, as the peridural space has a width of about one centimeter, but in case it should happen a higher or lower interspace must be chosen. After this achievement the analgesic solution is injected. The mixture used in Erlangen is : 1 tablet of 0.1 pantocain "Bayer" (syn. amethocaine) is dissolved in 10 c.c. boiling

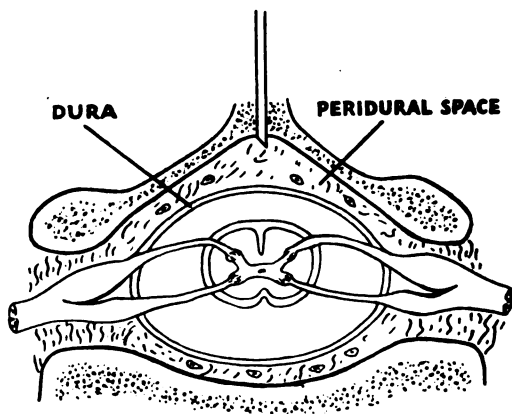


FIG. 2.—A schematic diagram of the spine showing the condition of the peridural space and the inserted needle.

saline ; 20 c.c. periston and 6 mins. of adrenaline are added. Periston is a solution with a high molecular gravity used for intravenous infusions. It is added in order to increase the viscosity, which is necessary to prevent the analgesic fluid from spreading into areas where the algesia is not required. Previously 5 per cent gelatine was employed instead of periston but as it cannot be sterilized adequately it was replaced by the latter. At intervals of three minutes three portions of 3 to 5 c.c. are slowly injected. Thus 9 to 15 c.c. of a 0.3 pantocain solution is required for the analgesia, the quantity depends on the general condition and the body-weight of the patient. After the second portion has been administered, the patient is laid on the affected side (stomach on the left, gall-bladder operation on the right side, etc.). About twenty minutes after the last injection the algesia is complete within an area of 2 to 3 segments above and 3 to 4 beneath the level of the site of puncture. It lasts two and a half to three hours.

CHOICE OF INTERVERTEBRAL SPACE.

<i>Body region</i>	<i>Site of injection</i>	<i>Obtained analgesia</i>	<i>Operation possible on</i>
Upper abdomen..	Between dorsal vertebra (D) 7 and 8	From D. 6 – D.10	Stomach, gall-bladder, etc.
Middle abdomen	Between D.9 and D.10	From D. 8 – D.12	Transverse colon, kidney and umbilicus, etc.
Lower abdomen..	Between D.11 and D.12	From D.10 – L.3	Appendix, sigmoid and gynæcological, etc.
Groin region ..	Between L.1 and L.2	From D.12 – L.4	Hernia, genital organs, etc.
Lower extremity			
(a) upper leg ..	Between L.2 and L.3	From L. 1 – L.5	Anterior and lateral parts of thigh
(b) lower leg ..	Between L.4 and L.5	From L. 3 – S.2	Lower leg and posterior parts of thigh
Anal region ..	Between L.5 and S.1 or from the sacral canal, known as extra dural sacral or caudal block	From L. 1 – S.4	Anus and perineum, etc.

For the abdomino-sacral rectum resection two different vertebral interspaces are punctured simultaneously, one between D.11 and D.12 and one between L.5 and S.1. Below the level of L.1 there is a wide distance between the spinal nerve-roots, accordingly an increased spreading of the analgesic fluid is desired and for this reason periston and adrenaline have to be omitted. The periston is substituted by the same amount of saline, in order to maintain the same concentration.

In this hospital 58 P.D.A. were performed within a period of seven months for the following kinds of operations :

Thoracoplastic	1	Removal of semilunar cartilage of	
Stomach resections	6	knee-joint	4
Nephrectomy	1	Varicose veins	5
Laparotomy and colostomy ..	2	Sciatic nerve suture	2
Appendicectomy	3	Osteotomy on lower extremity..	4
Bilateral inguinal hernia ..	22	Hæmorrhoids	2
Hernia after laparotomy ..	2	Urethra plastic and cystostomy	1
Amputation of lower leg ..	2	Hallux valgus	1

For the thoracoplastic 2 L.P. needles were inserted simultaneously, one between D.3 and D.4 and one between D.6 and D.7. The quantity of algesic mixture injected in each was one third less than used for one puncture.

As the original drugs used in Germany were not available we had to alter the algesic mixture. At our disposal were novutox and amylocaine. A suitable remedy for increasing the viscosity was dried human plasma from the Army Blood Transfusion Service. At present the following mixture is employed : 40 c.c. of novutox 2 per cent, amylocaine 0.5 per cent, in which 3.5 grammes of dried human plasma is dissolved. 24 to 30 c.c. of this compound is injected in three portions in intervals of three to five minutes. Otherwise the details of

the method are the same as described. About thirty minutes after the last injection the anaesthesia is complete and it lasts two to two and a half hours. Below the level of L.1, blood plasma is omitted for the same reason as previously mentioned. The results are very satisfactory and post-algesic disturbances have never been observed so far.

The advantages of the P.D.A. compared with the spinal analgesia are obvious. It can be confined to the required area of the body on which the performance of an operation is intended. That means less sympathetic fibres are affected and so the fall in blood-pressure is almost non-existent. In case it does occur, mostly by injecting too quickly or due to a poor general condition of the patient, it can easily be dealt with by administration of an analeptic drug, preferably ephedrine subcutaneously. Although the motor fibres are only little affected the abdominal wall is completely relaxed. Post-analgesic headache never occurs. A special position of the patient is not required as the fluid with the high viscosity is kept in the areolar tissue. Another safeguard is that the peridural space is confined superiorly at the foramen magnum by the fusion of the dura with the periosteum. For the latter reason the P.D.A. can be practised even in thoracic surgery.

As the drug does not penetrate into the subarachnoid space but only blocks the nerve-roots, the P.D.A. can be considered as a mere regional nerve-block or conduction analgesia. Hence all dangers of the spinal analgesia are excluded while obtaining the same analgesic effect.

A NOTE ON A DISINFESTATION PLANT USED IN A TYPHUS HOSPITAL FOR PRISONERS OF WAR IN GERMANY.

BY

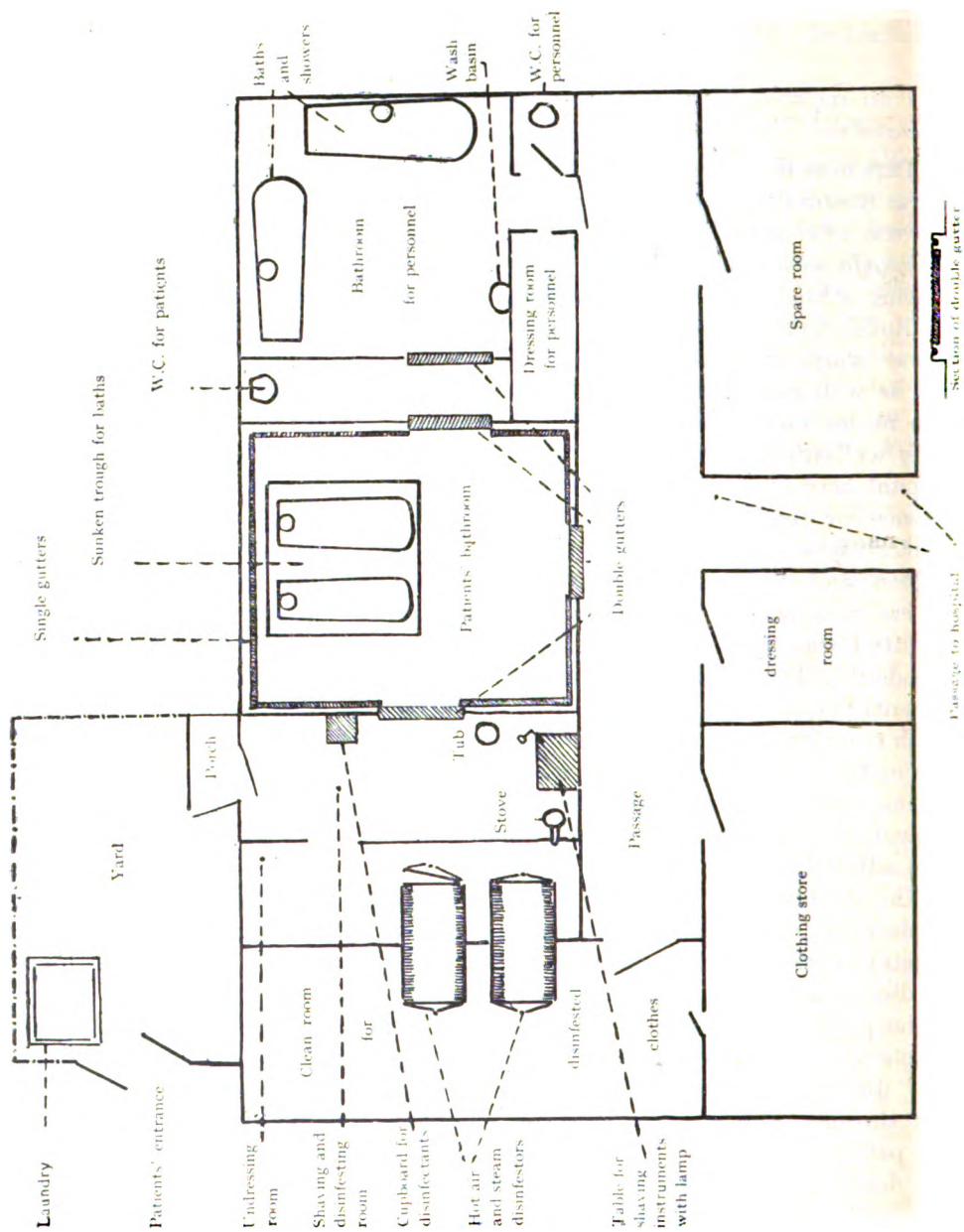
Major S. G. COWPER,
Royal Army Medical Corps.

[Received July 10, 1946.]

THIS note describes a static disinfestation plant which was used in a prisoner of war hospital in Germany during the typhus epidemics which occurred there between 1941 and 1943. The hospital in question was the *Reserve Lazarett für Kriegsgefangener* set up at Egendorf, Thüringia, in a former Hitler Youth training school, and opened for prisoners early in 1942. With the arrival of the Russian prisoners of war in 1941 typhus broke out in a number of prisoners of war camps and working centres, and spread to prisoners of other nationalities, as well as to members of the Wehrmacht. Apprehension of the danger of a major epidemic decided the German authorities to open a number of fairly well-appointed typhus "Lazaretten" for prisoners, for many of whom hospital accommodation and treatment had hitherto been conspicuous by its absence or deplorable inadequacy. After the epidemic had subsided the hospital was used for general medical cases of British, French, Russian, Serbian and Belgian nationalities, and was staffed by captured R.A.M.C. officers and personnel. The strict disinfestation discipline for all patients admitted was, however, maintained by order of the German Medical Superintendent. The medical personnel, who were all young, had been immunized by anti-typhus inoculation. The apparatus installed and the technique which the German authorities recommended aimed at providing an absolutely safe method of hospitalizing a vermin-infested population in an area where typhus was epidemic or sporadic. In the following paragraphs a description is given of the installation and of the ritual carried through when patients were admitted.

The disinfestation centre occupied one corner of the ground floor of the hospital and consisted of seven rooms and a central passage leading from the hospital corridors. The only entrance through which patients could reach the disinfestation room was separated by barbed wire from the remainder of the hospital compound, and no new arrival was ever admitted, whatever his complaint, by any other route. Passing through this yard the patient entered the "dirty room" adjacent to the "clean room" with which it connected only through the two disinfestation cylinders, one steam and one hot air. The patients' bathroom was separated from the bathroom for personnel by two double gutters full of disinfectant. The bathroom was kept flooded over with disinfectant and was surrounded by a single gutter, while the baths themselves stood in sunken troughs, also kept flooded with disinfectant.

The staff required to carry through the ritual was one medical officer and three orderlies, who were distributed as follows: one in charge of the shaving and disinfesting room, one in charge of the patients' baths and one in charge of the undressing room.



When the arrival of a patient was announced in the hospital the following procedure was strictly followed. The orderly medical officer and two duty medical orderlies proceeded to the dressing room for personnel where they stripped completely and dressed only in a one-piece canvas typhus suit and wood and canvas clogs proceeded through the patients' bathroom to the shaving and disinfesting room. The German canvas typhus suit was in one piece with a hood for the head, leaving only a space for the eyes, and each sleeve covered the hands, leaving a separate space for the thumb but not for each finger. The pattern differed from the type of suit recommended by the Ministry of Health. The latter had a separate head-piece and the arms ended at the wrist so rubber gloves were used extending to the elbows, with rubber Wellingtons up to the knees. The German type guarded the mouth and could be pulled over the nose and tied behind the head, and everything was enclosed in one piece.

The disinfesting and undressing room and gutters were flooded with lysol or cresol by the duty orderly who then brought in the patient and made him undress completely and give up all his small kit and clothes for disinfestation. These belongings were then all placed in the hot air disinfester for treatment, except for photographs, watches, fountain pens and food. The patient then stood naked in the disinfesting room and was inspected by the duty medical officer in the light of a bright lamp. This inspection included examination of the nose and ear passages. The orderly then proceeded with razor and barber's clippers, kept on the table in lysol, to shave *all* the patient's hair from head, axillæ, groins and abdomen, and perianal region, and to cut his nails short. While this was going on the medical officer syringed the patient's ears and nasal passages with a solution of zephyrol kept ready in the cupboard. If the patient was too ill to stand he lay naked on a stretcher while he was inspected and shaved. All hair was burnt immediately in an iron stove.

When the medical officer was satisfied, after his final inspection, that there were no lice the patient was douched with zephyrol from head to foot, and cuprex was applied to groins, axillæ and head, and thereafter he stood naked for twenty minutes. The disinfesting room was kept very well heated. If the patient had on a plaster cast, ether was introduced between the plaster and the skin.

At this point the medical officer had completed his duties and carefully discarded his typhus suit and wood and canvas clogs which were then added to the patient's clothes for disinfestation in the cylinders. Carefully avoiding the sheet on the floor of the undressing room on which the patient stood to be shaved, he then proceeded naked through the patients' bathroom to the bathroom for personnel where he took a hot bath with carbolic soap and returned to the dressing room for personnel where he had left his clothes. In the meantime the duty orderly in the patients' bathroom supervised the patient's carbolic bath and shower. As all lice were now removed and as the danger of inhalation of dirt containing *Rickettsiæ* from the patient was removed by the douching with zephyrol and cuprex, this bathroom orderly

was dressed only in a pair of shorts and did not wear a typhus suit. He was strictly forbidden to enter the undressing and shaving room.

After the patient had passed through the ritual of shaving, inspection, soaking in zephyrol and cuprex, carbolic bath and shower, he was dried and given a towel, a clean hospital shirt or nightgown, a blanket and clogs, and passed across the passage to the clean dressing room where he waited to enter his hospital ward. Any patient who was too ill to stand was treated throughout the whole ritual on a stretcher which was placed on supports underneath the showers.

The medical orderlies then discarded their typhus suits and clogs, which were disinfested in the boilers, and took carbolic baths and showers. Before taking their baths, however, it was the duty of the orderlies to clean down the undressing room and shaving room with a hose and brush, after burning all hair and soiled dressings ; while the bathroom orderly cleaned the bathroom in the same way.

The sheet on which the patient stood, together with the patient's towels, were soaked overnight in a large tub of cresol and then boiled in a special boiler in the outside laundry, after which they were transferred to clean water and reboiled.

The patient's clothing was recovered next morning through the door of the clean room and taken up to his hospital ward.

In practice the hot air disinfestation cylinder was used as the steam had a damaging effect upon leather equipment, etc. The clothes were placed in the hot air cylinder at a temperature of 70° C. (158° F.) and were recovered next morning via the opening into the "clean room."

There was, of course, no D.D.T. or A.L. powder available at this time. Zephyrol is similar to the I.C.I. disinfectant and cleaning agent C.T.A.B.

It is believed by the hospital authorities that the method conscientiously used, provided a "foolproof" technique for dealing with the hospitalization of a vermin-infested population. The system of double gutters and floors flooded with disinfectant makes it virtually impossible for a louse which falls to the ground to survive. A hospital is absolutely safe so long as no lice are admitted to the wards. Altogether only two cases of pediculosis were discovered in in-patients in the first six months and two more in the second six months (both patients with plasters). This gave a total of four cases of pediculosis in 1,904 admissions—a marked contrast to the frequency of pediculosis among the in-patients of another prisoner of war hospital in 1941 where there was no disinfestation plant.

I must acknowledge much helpful information and advice in the writing of this paper from Captain P. T. Cooper, *M.B.E.*, late *R.A.M.C.*, the senior British medical officer at the Lazarett.

MECHANICAL SAFEGUARD AGAINST BILHARZIA.¹

DESTROYING THE PARASITES.

BY.

Dr. F. GORDON CAWSTON, M.A.(Cantab.), F.Z.S.

Bilharzia is prevalent in many parts of Southern Africa, and many attempts have been made to eradicate the disease. The author suggests that the parasites can be eliminated by mechanical means when there is need to make use of bilharzia-infected water.

THERE is at present no adequate means of determining the amount of bilharzia disease prevalent in South Africa, though the proposal to spend £50,000 on a five-year campaign against the infection in Southern Rhodesia indicates its economic importance so far as Native labour is concerned. The difficulties involved may be judged by the report that, at the end of that period, the infection was on the increase.

In this campaign reliance was placed largely on an attempted destruction of the snails which conveyed the parasites to human beings, but due consideration of the problem as it affected Egypt and other countries since the cause of the disease was determined in the Far East about 1910 indicates that attention must be directed rather to curing infected persons and avoiding the infected water.

Sufficient attention has not been paid to the part the engineer could play in solving the problem, or to the fact that in farm life and in military camps infection never occurs from domestic supplies of water which have been pumped up from an open river and passed through a suitable reservoir or tank, but, in every instance, through exposing one's skin to water in the river itself.

WATER TREATMENT.

This experience points to the fact that the infection may well be avoided by rendering the free-swimming parasite inactive by mechanical means. Investigations in Natal at the end of the prolonged drought of 1945 have clearly shown that the forced disturbance of water and avoidance of all surface layers of water is sufficient to render water harmless.

As long ago as 1915 the Bilharzia Mission to Egypt fully recognized that the water organisms might survive for a day or two, but that the vast majority succumbed within twenty-four hours unless able to find their way into the skin of a human being or other animal. Some five years later the Chinese form of the parasite was found to survive for even seventy-two hours.

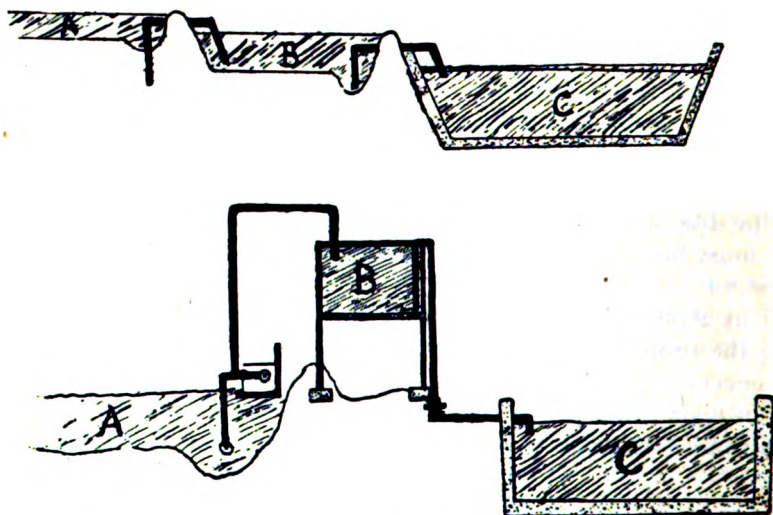
One has only to shake water containing the parasites to see how readily these cercariæ lose their tails and are destroyed, for they are fragile, short-lived and surface beings which have no power to encyst like some allied forms. This should be sufficient to convince anyone of the importance of mechanical means for rendering water wholesome.

¹Reprinted from *The South African Engineer*, 36, No. 334, 26, 28, February 1946.

ENGINEERING PROBLEM.

When I was asked to report on the water supply of Umtali, Southern Rhodesia, I explained that the problem was one for the engineer rather than the medical man. The health authorities at Klerksdorp, in the Transvaal, also raised the question whether the river water might not be passed through the power station and boiled.

There is no occasion to belittle the advantages of boiling infected water in a tank, adding paraffin to the surface layer to destroy other larvæ or adding copper sulphate to a swimming bath to produce one in a quarter of a million solution for destroying the bilharzia parasites. My contention, however, is that mechanical means may of themselves suffice.



Two alternative schemes for avoiding bilharzia parasites in water. A is the river, B the purifying tank, and C the reservoir or swimming bath supplied by syphon. In the lower diagram the raw water is elevated to B by pump.

A quarter-inch mesh cover for the intake pipe would prevent the entry of any infected snails. A coiled wire and other devices are sufficient to justify the use of a half-inch mesh, provided the pipe is led down into the river bed to avoid surface organisms produced by the snails, which, however, would be destroyed as the water was disturbed by pumping.

Should an infected snail find entry through the pipe supplying the reservoir, the parasites would rise to the surface as soon as they escaped from it. These would be avoided when water was led into a second tank through an escape pipe fed from the lower portion of the contained water. It is wisely suggested to me by Mr. W. H. Benvick, of Durban, that this is better syphoned off.

Provided two such tanks are safeguarded against snails, any infection from the bilharzia parasites may be regarded as impossible, for allowance must be made for the fact that most of the water will have remained away from the

river for two or three days to prevent the survival of the parasites ; and one is not concerned just now with other water diseases.

This system might well be applied to native villages where a swimming bath or similar collection of water should discourage bathing and paddling in infected streams, and it deserves the serious consideration of all interested in the control of water-borne infection in tropical countries and wherever bilharzia is known to occur.

From the zoological point of view, one hesitates to attempt the eradication of any mollusc or other natural purifier of water or the employment of chemicals which are liable to interfere with its natural enemies in open rivers, and it has been found in Natal that the snails are free from human parasitic infection for most of the winter months.

AIR EVACUATION OF CASUALTIES IN SOUTH EAST ASIA.

By

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D.D.M.S. H.Q., A.L.F.S.E.A.

[Received November 10, 1946.]

INTRODUCTION.

THIS article attempts to describe briefly the use and value of aircraft in the evacuation of casualties in the Burma Campaign.

The facts presented and the conclusions drawn can in no way be attributed to the personal experience of the author. They are written from official reports to which the writer had access in his capacity as D.D.M.S. H.Q., A.L.F.S.E.A. and from discussions and correspondence with individual officers who had a vast amount of practical experience in air evacuation in Burma.

The article is written in response to a request as it was felt that there were many readers who would be interested and who might find such an article informative and interesting.

When considering the task requested, the idea presented itself of obtaining a symposium of articles by those who were more fitted to deal with specific aspects of the problem. Such an idea, if implemented, had the advantage of relieving the author of a considerable amount of "deviling." It was found, however, to be impracticable as all officers had left the theatre and were widely dispersed throughout the world. To collect material from them would have necessitated long delay and it is probable that this article would never have appeared.

The author does not attempt to go into all details connected with air evacuation as time and space do not permit. Many aspects of interest and importance are missing, notably the detailed ground organization and staff requirements at Corps Medical Centres, the training of medical and nursing personnel in emplaning and deplaning of casualties, communications, and the controversy in respect of secondary roles for aircraft used primarily for evacuation of casualties.

The author expresses the hope that this inadequate effort may stimulate readers who possess detailed practical experience of air evacuation to express their opinions in print on specific aspects of air evacuation to the education and benefit of the uninformed.

HISTORICAL.

In the early days of the Burma Campaign two main factors dictated the organization of medical evacuation. The first was the siting of hospitals so as to reduce evacuation to the minimum and the second was the control of evacuation so that it did not interfere with either the patient's treatment or the work of the hospital to which he was admitted. It was obvious that a

patient could not be cured and moved at the same time and that a large hospital used for transit could not perform its proper function of curing the sick.

To meet these requirements, large hospitals were therefore sited as far forward as possible in order to reduce evacuation. The bed capacity of Field Ambulances and C.C.S.s was also increased and light equipment added so that these units functioned as small hospitals for urgent sick and battle casualties, taking up to three or four times their authorized holdings. From these beginnings there evolved the first light casualty hospital in South East Asia, the Indian Malaria Forward Treatment Unit, which fully justified its inception during the campaign.

The siege of Imphal put an end to the policy of siting large hospitals forward but, at the same time, established the necessity for air evacuation. The Medical authorities, notably Brigadier G. E. MacAlevey, D.D.M.S. 4 Corps, and Major-General T. O. Thompson, D.D.M.S. Eastern Army, were vividly aware of the advantages to be gained from air evacuation and pressed the Staff from the beginning of the Burma Campaign to provide aircraft. Due to their perseverance, aircraft, with certain limitations, were made available and were first used on an organized plan in the Arakan in 1943. From then on air evacuation became an essential part of the plan of campaign in Burma, where road and rail communications were difficult or non-existent and where the rapid advance of the army frequently necessitated leaving the country behind to revert to enemy hands for considerable periods. Air evacuation was planned in two phases :—

Phase 1.—Evacuation from Divisional Medical Units in the most forward areas to the Corps Medical Centres located in the Corps area. These Divisional Units were often under continuous shell and mortar fire and frequently in range of small arms.

Phase 2.—Evacuation from Corps Medical Centres to Advanced Base Hospitals.

EVACUATION FROM DIVISIONAL MEDICAL UNITS.

Evacuation from Divisional Medical Units was carried out by light aircraft of the following types :—

L.5—known as the “ Flying Jeep ” or “ Stenson ” (American). This was a single seater high wing aeroplane with a low landing speed, capable of carrying 1 sitting casualty. A proportion of these aircraft were modified for carrying 1 lying casualty each. The stretcher was loaded in the rear cockpit by opening a panel in the wall of the fuselage. The patient was normally carried head foremost, but in cases with injuries of the lower limb necessitating the use of the Thomas’ splint, the stretcher was loaded head tailwards and the end of the Thomas’ splint threaded into the fuselage. This plane was very safe, possessing efficient landing brakes and an economic range of 100 miles.

L.1—otherwise known as “ Vultee Vigilant.” This was a single engine, high wing, light monoplane, with a capacity for 1 pilot and 1 sitting case. A certain number were modified to carry 1 lying case. Certain large editions of this plane were capable of carrying 4 lying and 3 sitting or up to 8 sitting cases.

C.64—known as the “Norseman.” This was a single engine, high wing monoplane, carrying 4 lying and 4 sitting cases or 8 sitting cases.

Tiger Moth.—two seater biplane. Carried 1 sitting or 1 lying case in the rear cockpit according to whether or not the aircraft had been modified to deal with the latter. When so modified the patient was lowered in a Neill Robertson stretcher provided with the aircraft. The patient was unable to see out and required considerable reassurance before emplaning. This plane had no landing brakes, which proved a danger in high wind.

Fox Moth.—This plane did invaluable service in the Southern Arakan and in the evacuation of West Africans in the Kaladan. It was a single engined biplane flown from the rear cockpit. Forward of the latter and below was a four seater cabin, capable of carrying 4 sitting or 1 lying case, with attendants. It had good landing brakes.

Available Forces and Control.

Two squadrons of U.S.A.A.F. Air Commandos, each composed of thirty-one L.5s and four or five C.64s, were available throughout the campaign and were allotted on the basis of one squadron per Corps.

An additional flight consisting of twelve L.5s and three L.1s of the U.S.A.A.F. was available for part of the campaign, notably during the siege of Meiktila.

In the earlier phase of the campaign, R.A.F. “Moths” were attached to the U.S.A.A.F. Squadron.

A flight of R.A.F. L.5s belonging to 221 Group R.A.F. was employed in the evacuation of R.A.F. casualties, and their services were fully and willingly lent to the Army on many occasions.

These light aircraft were controlled by a Squadron Commander U.S.A.A.F. who worked in close liaison with the Corps Medical Authorities. Aircraft were allotted to “runs” as required and were *at the disposal of the Medical Services*.

They were based at Corps airstrips but flew to Divisional airstrips daily from first light (06.00 hours) to about 16.00 hours.

As a routine, the last aircraft from any given Divisional airstrip brought an estimate of the number of sorties required for the next day. This had the effect of limiting signal demands for aircraft to emergency requirements only.

Airstrip Required.

A ground strip of 500 yards by 30 yards was necessary to take all types of light aircraft used. Such airstrips were usually constructed by medical personnel of the Divisional Field Ambulance or by Staging Sections in accordance with specifications submitted by the Air Force authorities concerned. The location of the strips was signalled by the A.D.M.S. of the Division to the D.D.M.S. of the Corps. The latter then signalled the Squadron. It was usually not difficult to obtain suitable ground, though considerable work was required in removing bunds and clearing undergrowth. The ground was tested for suitability after clearance by driving a 15 cwt. lorry over it, and

small mounds were levelled. On occasions assistance was given by the Divisional Engineers.

Airstrips were marked with white strips, an "L" strip 3 feet by 3 feet by 1 foot being placed at each corner and white strips 6 feet by 1 foot being placed at 50-yard intervals to mark the external boundaries of the strips.

A "T" was placed on the left of the airstrip, half-way along, the long arm pointing towards the approaching aircraft. The factor governing the place of the "T" was tree clearance and not the direction of the prevailing wind.

The Divisional Medical Units were responsible for the reception, treatment and emplaning of all casualties. Fig. 1 illustrates a diagrammatical lay-out of an airstrip used at Thekigin in December, 1944.

When the strip was completed, a reconnaissance plane flew over the site in the early morning and photographed the area. If it was considered satisfactory for landing and take-off, the required number of planes flew over immediately. During the Meiktila-Rangoon advance the number of strips constructed was greater than that during a corresponding period at any other time, yet none of the strips was refused by the Squadrons.

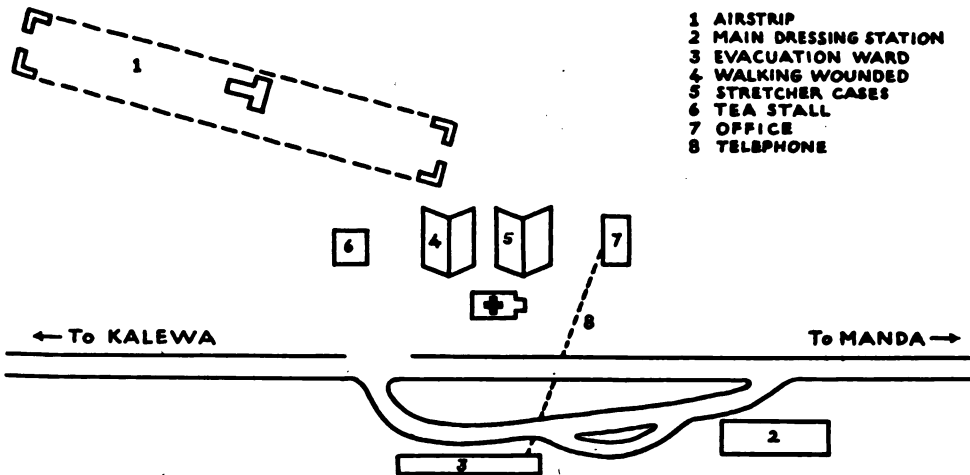


FIG. 1.—Diagrammatical lay-out of Forward Light Airstrip at Thekigin.

Inter-communication.

The official channel for liaison between the squadron and the forward Medical Units was through the D.D.M.S. of the Corps, and personal contact was frequently made between the pilot and the forward troops. Often pilots were able to discuss the suitability of the strips with the officer in charge of the construction. The system adopted in the Fourteenth Army in which the Squadron worked under the D.D.M.S. of the Corps proved to be more satisfactory than that in which there was direct liaison between the forward area and the rear strip.

EVACUATION FROM CORPS MEDICAL UNITS.

Dakota aircraft (C.47) were in the main employed, but on occasions Commandos (C.64) were also used. The former carried 18 lying and 12 sitting or 30 sitting with normal personal kit. The Commandos were larger types of Dakotas and carried 24 lying and 8 sitting or 34 sitting cases.

Available Forces.

One squadron (24) of Dakota aircraft was employed constantly and solely for the fly-in or reinforcements and the air evacuation of casualties. In addition a variable number of store-carrying Dakotas and Commando aircraft was available and used for evacuating casualties on their return trips.

The aircraft employed were mixed R.A.F. (Transport Command) and U.S.A.A.F. (Combat Cargo Task Forces Bengal-Burma). The Army link with these authorities was through a Commander Army Air Transport Organization (C.A.A.T.O.) who was based at Comilla.

Operational Employment.

These aircraft had to cover the requirements of Corps and the L. of C., including districts, areas and sub-areas.

Estimates were made by the formation medical authorities by airfields giving the number of sorties required for each *per diem*. Estimates covered a fourteen-day working period and were submitted to the staff of the formation concerned seven days before the commencement of the fourteen-day period for which they were required. These demands were submitted through staff channels to Army H.Q. The latter submitted a consolidated demand to C.A.A.T.O. which included all formations.

From the estimated bids C.A.A.T.O. arranged to supply the number of aircraft required by airfields with H.Q. R.A.F. Transport Command and H.Q. C.C.T.F.

As a supplement to these fortnightly bids, there was an "S O S" service whereby, in cases of emergency, additional aircraft could be made available to any particular airfield or airfields at forty-eight hours' notice. These additional aircraft were demanded for specific days within the fortnightly period operative at the time of demand.

As the number of aircraft available was not always equal to the demands made, a system was adopted whereby the formations, airfields and medical units concerned were notified by signal of the numbers of aircraft available and their estimated time of arrival at each airfield.

This signal was made by C.A.A.T.O. on an "Emergency Operations" priority on the evening of the day before the flying of the sorties.

Aircraft were based at either Corps airstrips or at airfields in the Army area, depending on the terrain and weather conditions. During monsoon periods alternative routes had to be planned and new airstrips constructed.

The most cordial liaison existed between the Army and R.A.F. authorities to provide the maximum use of available aircraft in all types of weather.

All aircraft used for casualty evacuations were specially fitted to carry stretchers.

None of these aircraft were allotted for the sole purpose of casualty evacuation. They were usually employed on the outward run for the carriage of reinforcements, supplies and mail. Application was frequently made for ambulance aircraft for medical use only, but this was never permitted owing to the limited number of aircraft and consequent necessity for rigid economy in the utilization of those available for all purposes.

Airstrip Medical Organization.

Two airstrips were required, the first for the receipt of light aircraft bringing casualties from the forward areas, and the second the casualty evacuating strip for medium or heavy aircraft for further evacuation to advanced bases.

Both these strips were part of the same airfield, and the unloading and loading sites of both were located as near as possible. An arrangement of this kind allowed for the minimum use of road movement of casualties and the minimum requirement of ambulance cars. It further permitted one medical unit, under one control, being responsible for reception, treatment and further evacuation of casualties. It also allowed the simplest liaison to be maintained with airfield authorities.

The medical units on the airstrip were sited at least 400 yards from the strip, to which roads were made. Shade and air was considered, and the dust clouds thrown up by aircraft moving on dirt strips avoided.

The following medical units were employed on these airstrips :—(a) Field Ambulances ; (b) Indian Staging Sections (Combined) ; (c) Casualty Air Evacuation Units (C.A.E.U.) R.A.F.

The employment of field ambulances tended to immobilize a unit which in the battle plans was earmarked for the support of Corps troops.

The Casualty Air Evacuating Units of the Royal Air Force were well provided with personnel, medical stores and equipment. Since they possessed only British personnel they were a disadvantage in the Burma Campaign where the bulk of casualties were Indian troops. These units were not available until late in the campaign and of the total number of casualties only a minor portion passed through these units. They were never employed forward of Corps Evacuation Centres.

At all these units " triage " of casualties was carried out, i.e. the reception, sorting and classification into those requiring and fit for air evacuation to Advanced Base Hospitals, those for admission to Corps Medical Centres, and those unfit for further evacuation.

The minimum bed capacity was 50 but was capable of expansion up to 200. All casualties could be held, treated and fed up to two or three days, and abdominals up to ten days.

A minimum of five ambulance cars was considered necessary.

SELECTION OF CASUALTIES FOR AIR EVACUATION.

The advice of pilots was of considerable assistance in the selection of suitable cases, since flying conditions, such as altitude and " bumpiness " and the availability of oxygen had to be taken into account. With this information, normal clinical judgment was sufficient to ensure a correct choice of case.

All cases on arrival at the most forward Medical Units were given first aid treatment, including control and prevention of shock.

It was found that most casualties stood air evacuation well with the exception of the following cases :—

(a) *Scrub Typhus*.—Scrub typhus cases presented a definite risk, particularly in the first ten days of the disease. Even after short, smooth, low altitude flights, it was found that their condition deteriorated and several died. In most of these post-mortem examinations showed multiple venous thromboses, particularly of the lungs and, less frequently, of the lower limbs.

Fortunately the incidence of scrub typhus fell progressively after the end of the monsoon, and as the campaign progressed.

(b) *Eye Injuries*.—Interocular lesions were liable to further damage by flying at high altitudes and/or in “bumpy” conditions.

(c) *Chest Cases*.—Few pneumonia, pleural effusions or lung abscesses required evacuation, but those evacuated stood the journey well if suitable weather conditions were selected. Perforating wounds of the chest with hæmothorax or pneumothorax and partial or complete collapse of a lobe were, however, definitely a bad risk and were retained on the ground as long as possible.

(d) *Ear Cases*.—Acute suppurative conditions of the middle ear and their internal ear complications sustained a definite risk of aggravation.

(e) *Anæmia Cases*.—Cases of anæmia travelled badly and were held till their hæmoglobin level was above 50 per cent.

AIRCRAFT REQUIRED.

In the Arakan during February, 1944, the following air evacuation took place :—

By light aircraft from forward airstrips, 637.

By medium aircraft (C.47) from Bawli/Ramu area to Comilla, 765.

The force operating was four divisions, each with a strength of about 20,000. In the period January 30 to February 26 their estimated total casualties were 1,913, of which 998 were wounded, giving a percentage *per mensem* : Wounded, 1·25 per cent ; total casualties, 2·39 per cent (including killed, wounded, sick and missing).

Thus in a total of approximately 1,000 casualties over 600 were transported by light aircraft, which was equivalent to 2 per 1,000 per day. This figure of 600 included some sick as well as wounded, especially from 81 West African Division, who were for a while entirely dependent on these light planes.

The conclusion reached by D.M.S. 21 Army Group (Major-General T. O. Thompson) was that for a campaign of moderate intensity in a healthy area (sick rate less than 3 per 1,000 per day), the number of cases which required lift were as follows :—

By light aircraft, 0·8 per cent of strength *per mensem*.

By medium aircraft, 0·95 per cent of strength *per mensem*.

As the campaign progressed, fighting had to take place in areas where malaria and typhus were endemic and where sick rates were high. Inexperienced

troops suffered heavier casualties from malaria in the early phases of a campaign. This was evident from a consideration of the different rates in Divisions fighting at the same time and on the same terrain. Such differences were due to different standards of anti-malaria discipline. This situation increased the number of casualties requiring evacuation by air, and by March, 1945, evacuation in the Fourteenth Army by light aircraft had averaged from 1,000 to 1,100 weekly.

Light Aircraft.

As a result of experience the Medical Authorities considered that one squadron of light aircraft (32) was necessary for each fighting division operating in Burma where sick rates varied from 5 to 10 per cent according to the terrain and period of the year. Highest sick rates were recorded in March and July. A daily lift of 36 casualties over an average range of 50 miles was required.

It was considered that each aircraft should be capable of lifting from one to three casualties and carrying at least one stretcher.

Medium Aircraft.

One squadron capable of lifting 48 casualties per day over an average distance of 150 miles was considered necessary.

COMMENTS.

Use of Light Aircraft.

Casualty evacuation was the primary role of all squadrons. Though this was never laid down officially by any higher authority, the fact that casualty evacuation was the first task was accepted by the Squadron Commanders and the Medical Branch at Corps Headquarters. This view was not held throughout the Corps and no authority for employing light aircraft on the primary task of casualty evacuation was laid down by any higher formation. It was generally the opinion that unless definite authoritative orders were laid down to Squadron Commanders and aircraft were specially allotted for casualty evacuation, these aircraft might be dissipated on secondary tasks for which other aircraft should be allotted. All aircraft were employed in secondary tasks but except in the case of flying in of emergency medical supplies, these secondary tasks were never allowed to interfere with evacuation of casualties.

Such secondary tasks were :—

- (a) The emergency flying in of medical supplies, especially whole blood.
- (b) Flying in reinforcements, mail, food, and ammunition, and items of personal kit. These trips were always part of a casualty evacuation sortie.
- (c) Transporting V.I.P. within the Corps area. Frequent demands for transport to and from forward areas were refused. The Squadron Commanders agreed that facilities should be given only to General Officers and those with a request from Corps or Divisional H.Q.
- (d) Spotting for artillery.
- (e) Dropping and picking up messages.
- (f) Reconnaissance flights.

The service was uniformly excellent. The highest degree of co-operation existed between the U.S.A.A.F. and the Army Medical Authorities. A very deep debt of gratitude is owed to the personnel of the U.S.A.A.F. squadrons for their unfailing readiness to undertake any task required of them, and there is no question that many British and Indian soldiers owe their lives and limbs to the courage and endurance of these pilots.

Equally cordial were the relations between the Royal Air Force and Army Medical Authorities, and the same tribute is due to the pilots of the R.A.F. Light Aircraft.

The types of aircraft were well suited to the purpose, but it was considered that a higher proportion of C.64s would be an improvement, as would the modification of all L.5s to take lying casualties.

The allotment of aircraft was insufficient in that where Corps were adequately served, no cover was available for Army troops. Experience proved that additional aircraft were required for the evacuation to Army Medical Centres, when these were established, and for the evacuation of casualties from forces engaged in operations directly under Army Command.

It was impracticable to direct aircraft from the Corps allotment for such purposes, due to the difficulties of maintaining such detached aircraft.

It was estimated that one self-contained flight of 24 L.5s aircraft was required for "Army needs."

Supplies of special fuel (74 octane) were required for L.5s, L.1s and C.64s and had to be planned for by "Q" Services at all times, since these aircraft would not fly with safety on any substitute fuel.

Use of Medium Aircraft.

The fact that no aircraft were allotted for the sole purpose of casualty evacuation raised certain difficulties which must be mentioned. These were as follows :—

(a) The unavoidable last-minute alteration or cancellation of scheduled sorties on account of weather conditions at the base, *en route*, or at the forward areas. This constituted a major difficulty during the monsoon, but was of no major importance at other times.

(b) Faulty briefing of pilots at base. This resulted in the non-arrival or late arrival of aircraft, or the arrival of excessive numbers of aircraft at the same place and time, and led to unavoidable delay in the loading or to unnecessary haste in loading and to inconvenience to the evacuating medical unit. Worse still casualties were sometimes kept waiting for long periods on hot and dusty airstrips. Occasionally they had to return to the evacuating medical unit and await evacuation until the following day.

(c) Delay in signal communications. Although the signals were all made on "emergency operations" priority, they could not be despatched until the evening of the previous day, when the numbers of aircraft available could be assessed. Further delay was caused by the fact that all signals were made in cipher, and had of necessity to be routed through the nearest formation where they could be deciphered before delivery to the airfield and medical unit

requiring the information. As a result signals were sometimes received after, and never more than a little before, the estimated time of arrival of the aircraft. It was generally felt that this defect would be overcome by : (i) The use of code, enabling ciphers to be omitted ; (ii) the provision of a signals link (preferably wireless) between medical centres and the nearest formation H.Q.

As a result of these difficulties, commanders of medical units often refused to send casualties to the airfields until a firm confirmation of the expected time of arrival of the aircraft was received by them. This refusal was in the best interests of the casualties, but caused delays in the loading and turn round of the aircraft when these arrived without warning or were ill-spaced. Precious sorties were thus lost, and friction engendered among personnel.

It is only fair to say that an appreciation of these difficulties was, and could only be, acquired gradually, and it was not until the end of the campaign that a clear account of them was presented to C.A.A.T.O.

(d) No permanent medical or nursing staff was available for the aircraft, and, when required, they had to be provided by the evacuating medical unit.

Airstrip Medical Staff.

It was obvious that whatever medical unit is employed must be capable of unloading from aircraft, sorting casualties, attending those awaiting evacuation, and loading of heavy aircraft all at the same time. For this purpose it was essential to have an adequate number of non-medical officers or British N.C.O.s, and an efficient inter-communication system between ground control staff and the airfield evacuation unit, also between the latter and the medical centre. Such communication was generally by telephone and worked well. Adequate water supply, cooking facilities and latrine accommodation had to be provided. A jeep was considered essential for the Officer commanding the medical unit.

Five ambulance cars for a Corps airstrip was considered the minimum required. A platoon of an Indian Stretcher Bearer Company proved invaluable for the loading and unloading of aircraft.

Welfare Service.

It was agreed that some form of Welfare Service such as Red Cross, Toc H or WAS(B) Mobile Canteen should be attached to the medical unit on the airstrip.

Evacuation of Infectious Cases.

On one occasion the evacuation of some cholera cases was refused on the grounds that U.S.A.A.F. regulations forbade the carriage of infectious cases. No such regulations, it is understood, were made by the R.A.F.

Apart from the need for uniformity of regulations between the Services concerned, there does not seem to be any objection to the carriage of all types of infectious diseases by air, provided that aircrews are effectively protected by appropriate inoculation or vaccination ; that arrangements for the disinfection of the aircraft after use are available where necessary ; that suitable containers for infectious excreta are made available ; and that efficient arrangements are made for the isolation of infectious cases at the evacuating units, in transit, and at the receiving airfield.

CONCLUSION.

The main lessons learned from the Burma Campaign concerning casualty air evacuation were :—

(a) The absolute necessity of light aircraft being allotted for purely medical purposes and being under the direct control of the Army Medical Administration of the Formation.

(b) That the Army Medical Units must staff the forward airstrips. These strips are on Field Ambulance level, and in the Burma Campaign were constructed often within a few hours of the occupation of the ground by forward troops. Though the duty of manning these strips devolved on Field Ambulances and Staging Sections, there is need for either special small Mobile Evacuation Units or the use of the Field Medical Company for these duties. In either case, the essential is they should be Army units and under the strict command of Medical Administrative Officers.

(c) The necessity for a minimum number of ambulance transport aircraft to be devoted to medical purposes only and equipped as hospital planes. Such planes must be staffed by medical personnel and there must be a pool of medical personnel for employment with such aircraft when evacuating.

SUMMARY.

A brief description of air evacuation of casualties in the Burma Campaign has been given. Experiences gained in the use of light and medium aircraft in the evacuation of casualties have been noted and the necessity for allocating such aircraft solely to the Army Medical Services for the primary task of casualty evacuation has been stressed. A brief note has been included on the experiences gained in the selection of casualties for air evacuation.

ACKNOWLEDGMENTS.

I have to thank Major-General W. E. Tyndall, *C.B.*, *C.B.E.*, *M.C.*, Director of Medical Services, Allied Land Forces, South East Asia, for permission to forward this article.

It is impossible to mention by name the individuals who contributed notes and reports and who by verbal discussion largely contributed to the material for the above article. If any such individuals should read this, it is hoped that they will accept this as a personal acknowledgment to them.

*Clinical and Other Notes.***THE WORTH-BLACK AMBLYSCOPE ADAPTED
FOR MILITARY ORTHOPTIC TRAINING.**

BY

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AND

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[Received November 5, 1945.]

IN checking binocular vision and fusion, difficulty was experienced in getting an accurate result while the patients held the instrument in their hands. To overcome this difficulty the following adaptor was designed by this centre. The construction of the adaptor being carried out by the local Sub-Workshop, R.E.M.E.

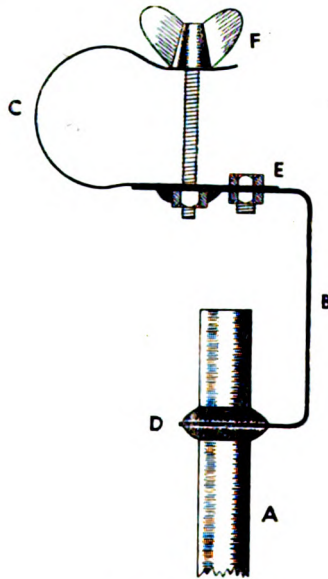


FIG. 1 (To Scale).

- A. Mild-steel tube. Length 6 in. Inside diameter $\frac{1}{2}$ in. Outside diameter $\frac{3}{4}$ in.
- B. U-Shaped mild-steel strip. Width 1 in. Thickness $\frac{1}{8}$ in.
- C. Mild spring-steel holder for instrument Worth-Black. Width $\frac{1}{4}$ in. Thickness $\frac{1}{16}$ in.
- D. Welded joint of A to B.
- E. Nut and bolt securing B to C.
- F. Wing-nut to secure instrument firmly in adaptor.

A piece of steel tube of a diameter to fit into the top of the stand telescopic of the test-type holder was obtained (see A, fig. 1). To this a U-shaped strip of mild steel (B, fig. 1) was welded, and a piece of mild spring-steel shaped

as C was bolted to this. This was drilled and threaded with a bolt fitted with a wing-nut to grip the tubular arm of the amblyoscope.

The amblyoscope was fitted to the adaptor, and before being screwed down a piece of soft cloth was placed between the holder and the instrument to

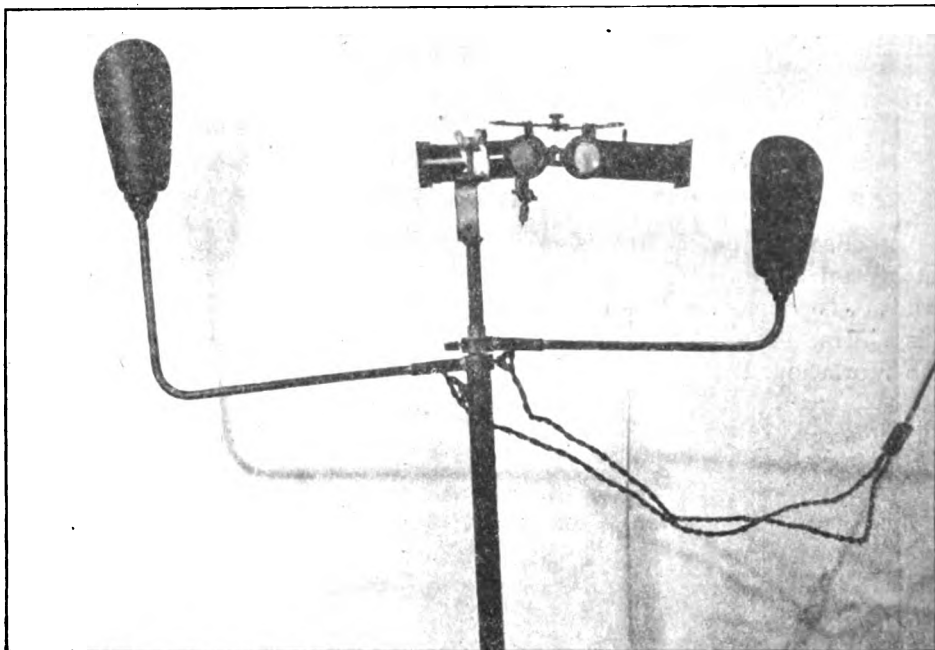


FIG. 2.—Worth-Black Amblyoscope fitted with adaptor and placed in the telescopic stand of the test-type holder.

further the grip and to prevent damage. The instrument complete with the adaptor as shown in fig. 2 was then placed in the telescopic stand and adjusted for height.

Reviews.

PENICILLIN IN GENERAL PRACTICE. By J. L. Hamilton-Paterson, M.D.
London : Staples Press, Ltd. 1946. Pp. 95. Price 5s.

This small book contains all the information on penicillin required by the general practitioner. The first half of the book is concerned with the history of penicillin and the principles which govern its action, as well as enumerating the various organisms which are susceptible to the drug. The second half deals with the methods of administration and elaborates the treatment of individual diseases. The information is accurate, concise and detailed, and

the author has the pleasant faculty of crystallizing his information. Not many neurologists would share the author's doubt as to the rival claims of the sulphonamides and penicillin in the treatment of uncomplicated cases of cerebral-spinal fever, and surely 50,000 units intrathecally is rather a cavalier dose. Not all brands of penicillin are suitable for intrathecal work and a word of caution might have been interpolated. Rather too rosy a picture is painted of the use of penicillin in empyema, for though it dispels the toxæmia the surgeon is still needed to deal with the fibrin clots. The general standard of the book is very high, and it is worthy of a place not only in the surgery but also in the hospital and dispensary.

R. J. G. M.

THE CONQUEST OF DISEASE: THE STORY OF PENICILLIN. No. 1—THE CONQUEST SERIES. By George Bankoff, M.D., F.R.C.S. London: Macdonald & Co., Ltd. 1946. Pp. 190. Price 6s.

Mr. Bankoff's account of the discovery of penicillin and its production cannot fail to interest his readers, as will his description of its use in disease, but here the author goes into details of dosage which will probably only confuse the layman for whom this book is written. It is evident that this book is not intended for the medical profession for its account of diseases, which comprises the earlier part, is couched in vividly emotional language and very simple terms and contains many inaccuracies which would not be tolerated in a scientific treatise. But even though the book is for the general public it is not fair to them to give such inaccurate descriptions; to cite only two instances, surely the *Staphylococcus aureus* is not the causative organism of puerperal fever, nor is the commonest empyema in adults that which spreads from a streptococcal infection beneath the diaphragm. Many portions of the book are purely speculative and among others the suggestion that large doses of penicillin might mellow the mind of a dictator is, to say the least of it, empirical.

The final chapter which puts forward the theory that the springs at Lourdes may contain penicillin may raise false hopes in the minds of afflicted readers.

C. R. St. J.

BROMPTON HOSPITAL REPORTS: Vol. XIII. Aldershot: Gale & Polden, Ltd. 1944. Pp. 187. Price 10s. net.

A further useful collection of papers by members of the staff of Brompton. Each article is based on wide experience and the occasional slight tendency to dogmatize is excusable in men engaged in teaching medicine. The clarity of thought and simplicity of language make each article readable without effort. Three of the twelve papers deal with "Thoracic Injuries," considerable experience of which was gained during the war, and penicillin can be said to be the only advance since these articles were written. Fluorography is convincingly shown to be the most powerful new diagnostic weapon against tuberculosis. The recommendations on Out-patient A.P. technique and hygiene for tuberculosis patients and staff could, with profit, be adopted by all concerned.

F. H. S.

PRACTICAL CHEMISTRY FOR MEDICAL STUDENTS. By William Klyne, M.A., B.Sc.(Oxon.), Lecturer in Biochemistry, University of Edinburgh, with a foreword by Professor G. F. Marrian, D.Sc.(Lond.), F.R.S., Professor of Chemistry in relation to medicine, University of Edinburgh. Edinburgh: E. & S. Livingstone, Ltd., 1946. Pp. xvi + 460. Price 20s.

This book has been written with the idea that theoretical chemistry given in lectures ought to be correlated with practical work carried out in the laboratory. The author has given short dissertations on the theory, followed by experimental work illustrating the lessons taught. The practical exercises do not require any complicated or expensive apparatus, are not difficult and should be well within the ability of the ordinary student.

After three short introductory chapters on fundamental scientific ideas, there follow two chapters on general laboratory procedure. Next are three chapters on general and physical chemistry, two on inorganic and four on organic chemistry including substances of biological importance. The usual appendices of measurements, atomic weights, logarithmic tables and first-aid instructions, very useful where students are concerned, complete the book.

The chapters are divided into numbered sections which, together with the index, facilitate reference. At the end of each chapter is a list of books recommended for further reading.

There are a few criticisms one can make in the hope that they may be helpful to the author in future editions. Vitamins are completely omitted, although there are simple tests for them which a student could carry out. Then the explanation of pH values is somewhat involved, especially to a beginner; perhaps if the treatment were a little less mathematical it might prove easier. It might be useful, also, to print the practical work in heavy type.

Careful perusal of the book reveals no errors of any importance and no printing mistakes and the publishers are to be congratulated on its excellent production.

In addition to its appeal to teachers of chemistry to medical students, the ordinary chemist will find the book interesting to read, and to medical men it should prove very useful now that the chemistry of drugs is becoming so interwoven with medicine.

S. E.

GYNÆCOLOGICAL ENDOCRINOLOGY FOR THE PRACTITIONER. By P. M. F. Bishop, D.M.(Oxon.). Edinburgh: E. & S. Livingstone, Ltd. 1946. Pp. viii + 124. Price 7s. 6d. net.

This is a very excellent little book, which considerably simplifies a complicated subject. It is, in my opinion, well worthy of a place on the shelves of every medical practitioner's library.

The appendix which tabulates the commercial preparations of "The Sex Hormones" is to be especially commended.

C. E. E.

OCCUPATIONAL THERAPY FOR THE LIMBLESS. By Phyllis Lyttleton, C.S.P., M.A.O.T. London : H. K. Lewis and Co. Ltd. 1946. Pp. 40. Price 3s.

This pamphlet gives practical suggestions regarding some of the crafts which may be employed, without needing too much equipment, in the treatment of patients who have lost limbs.

The main part of the instruction is devoted to the case of men who have lost one or both upper limbs or hands, but the case of lower limb amputees is also shortly considered. Emphasis is laid on the importance of a sympathetic and understanding approach on the part of the therapist in these cases.

Many of the suggestions made will be found useful in Military Hospitals for patients whose injuries place them in need of occupational therapy, but who have not actually suffered amputation. D. C. B.

FOOD AND NUTRITION. By E. W. S. Cruickshank, M.D.Aberd., D.Sc.Lond., Ph.D.Cantab., M.R.C.P. Edinburgh : E. & S. Livingstone, Ltd. 1946. Pp. vii + 326. Price 16s.

The introductory chapter of this very interesting book presents a fascinating picture of the development of our dietaries, and the effect of social conditions on our food habits, as well as explaining the effect of climatic, racial and religious differences on the habits of other countries.

A general review of the world food situation with its problems concerns the three following chapters, emphasis being given to the difficulties in Great Britain.

The remainder of the book, with the exception of the last two chapters, is given up to nutrition from the textbook angle.

This book covers such a wide field that it is difficult to know to whom it will be of most value. The student learning nutrition, or the practitioner who is interested in the historical side of our dietary and the workings of our rationing system during the two wars. There is something for everyone who is interested in Food and Nutrition. A. G-J.

Books received and placed in the Library, Royal Army Medical College :
BULLETIN OF THE HEALTH ORGANIZATION OF THE LEAGUE OF NATIONS.
Vol. XII, No. 1. 1945/46. London : George Allen & Unwin, Ltd. Price 5s.

ANNUAL REPORT OF THE LIBRARIAN OF CONGRESS FOR THE FISCAL YEAR ENDED JUNE 30, 1945. Washington : U.S. Government Printing Office, 1946. Pp. 233.

THE CONQUEST OF PAIN : THE STORY OF ANÆSTHESIA. By George Bankoff, M.D., F.R.C.S. Conquest Series No. 2. London : Macdonald & Co., Ltd. 1946. Pp. vii + 202. Price 6s.

This is a short history of anæsthesia written in terms which can be easily understood by the layman.

The author traces the various methods used to produce insensibility to pain, from the time of Hippocrates to the present day.

In turn he deals with mesmerism, the discovery of "anæsthetic gas" by

Priestley and its development by Davy, Faraday, and later Hickman, and the production of morphia by Sertuerner.

The story of the discovery of ether as an anæsthetic, and the unhappy controversy between Morton, Wells, Jackson and Long, is well told, and is of particular interest, as this year is the centenary of the first use of ether to produce surgical anæsthesia.

James Young Simpson and the discovery of chloroform supply an interesting chapter and the book concludes with brief mention of modern forms of anæsthesia and news as to possible future developments.

The author's pleasant style makes this a very readable popular history of anæsthesia.

W. H. S.

DEMONSTRATIONS OF PHYSICAL SIGNS IN CLINICAL SURGERY. 10th Edition.

By Hamilton Bailey, F.R.C.S., F.I.C.S. Bristol: John Wright and Sons, Ltd. 1946. Pp. xii + 375. Price 30s. net.

This book has marched from success to success over the nineteen years of its life. Ten editions plus seven reprintings in English is the measure of its popularity in those countries where English is used as the medium of instruction in surgery, while it has also been translated into German and Turkish. Spanish, Portuguese, Italian and Greek editions are now being prepared, and there are negotiations in progress for a Dutch edition.

This recital alone shows how the book has been welcomed in the past, and the life and vigour shown in previous editions are very evident in the present volume. The features of the book are familiar to a large number of medical men and women, but for those who have not known it before, it should be said that there are 375 pages, including an Index, and 573 illustrations, many of them in colour and all beautifully clear. The author has restricted himself to demonstrations of actual cases, and in this volume has revised the text, deleted some illustrations and added many new ones.

Austerity has made its pages smaller and its margins narrower, but the difficulties of producing a copiously illustrated work of this kind have been splendidly overcome, and the author's tribute to the publishers, photographers and technicians is well deserved.

Though Mr. Hamilton Bailey does not hold any official teaching appointment in this country, he reaches a very large "public" all over the world through his writings, and this volume will only enhance his reputation. We welcome this edition, and commend it to officers in charge of Medical Libraries and to Medical Officers generally in the Army.

D. C. B.

INTRODUCTION TO CLINICAL NEUROLOGY. By Gordon Holmes, M.D., F.R.S.

Edinburgh: E. & S. Livingstone, Ltd. 1946. Pp. vii + 183. Price 12s. 6d. net.

While it is generally recognized that a good understanding of the anatomical and physiological basis of the symptoms and signs of disease is necessary for the student of clinical neurology, teaching often falls short of what is desirable in this respect. In the general textbook of neurology little space is available

for anatomy and physiology, while in special works on the basis of neurology the practical clinical application is often missed. There is therefore a real need for the book under review which is unique in its general plan and in which neurological signs and symptoms are discussed as disturbances of function alongside the methods of clinical examination of the nervous system.

An excellent introduction to the subject has been provided, as the author has succeeded admirably in the task of integrating the physiological basis of signs and symptoms with practical clinical neurology, due no doubt to his long experience in teaching and research. The chapters on the motor, sensory and visual systems and also on reflexes cannot be criticized. Aphasia, agnosia and apraxia are lucidly explained and methods for their investigation outlined. The disturbances of the function of the bladder and rectum and of the autonomic nervous system generally are fully dealt with.

Perhaps only by expansion in one or two minor aspects could the book be improved and a more detailed treatment of the investigation of diplopia and of the use and value of the caloric tests might be given in later editions. The book will be found invaluable by both undergraduate and postgraduate students and will be read with profit by neurologists everywhere as it contains in all chapters much clinical wisdom from the pen of a great and experienced teacher.

S. N.

PEPTIC ULCER—ITS DIAGNOSIS AND TREATMENT. By I. W. Held, M.D., F.A.C.P., and A. Allen Goldbloom, M.D., F.A.C.P. Springfield, Illinois : Charles C. Thomas. 1946. Pp. ix + 382. \$6.50 post paid.

In the early days of the late war large numbers of sick were evacuated from the B.E.F. suffering from various forms of dyspepsia and, on further investigation in this country, it was shown that many of these patients were suffering from peptic ulcers. Soon it became clear that large numbers of dyspepsia and peptic ulcers were also being admitted to hospital from the Army at Home. A careful investigation indicated that this high incidence of gastroduodenal trouble in the Army was merely a reflex of the incidence in the civilian population.

Gastric troubles remained one of our major problems all through the war years but with an improved knowledge of the appropriate methods of treatment, and especially of disposal, the handling of such patients from a Service point of view became easier. Peptic ulcer is therefore one of the diseases we must give very careful attention to, and every opportunity should be taken to improve our knowledge of the best method of handling the problem.

Much valuable information is available in this new American volume on peptic ulcer by two well known American clinicians which covers the whole field of peptic ulcer and allied disorders in a very practical manner. It is divided into two parts. Part I starts off with a consideration of the aetiology and pathology of the ulcer and then continues the study of the symptoms and methods of investigation, ending with a review of the dyspeptic soldier (Functional (Military) Dyspepsia). Part II deals with peptic ulcers with

complications including the indications for surgical treatment in active gastric hæmorrhage and other complications sometimes associated with peptic ulcer. This information is set out very clearly and the paper and printing are so good that it makes it a pleasure to read. There are many excellent pictures of X-ray appearances illustrating different pathological conditions found in association with a peptic ulcer.

Notices.

LEISHMAN, ALEXANDER AND PARKES MEMORIAL PRIZE FUND.

WE have been asked to announce that the following prizes are open for award in 1947 after a lapse of some eight years due to the war.

(1) THE LEISHMAN MEMORIAL PRIZE.

A silver medal and a sum of approximately £30 to the individual officer of the Royal Army Medical Corps, or officer removed from the Corps but still on the active list, or of The Army Dental Corps, for the best work in any branch of Medicine, Surgery or the Allied Sciences or in connexion with the general duties of the Royal Army Medical Corps or of The Army Dental Corps brought to the notice of the Prize Fund Committee during the year but not necessarily completed within the year. The prize is open to officers holding regular or short service commissions in the Royal Army Medical Corps or The Army Dental Corps.

(2) THE ALEXANDER MEMORIAL PRIZE.

A silver medal and a sum of approximately £70 to the individual officer of the Royal Army Medical Corps holding a regular or short service commission, or an officer removed from the Corps but still on the active list, who by professional work of outstanding merit has during the year done most to promote the study and improvement of Military Medicine, Military Surgery, Military Hygiene or Military Pathology.

First consideration will be given to original articles or reports of investigations of value from the point of view of Military Medicine, Surgery, Hygiene or Pathology, and published in one or other of the various medical journals. Part authorship of an article is not to be considered as justifying an officer to be recommended for this prize.

(3) PARKES MEMORIAL PRIZE.

A silver-gilt medal and a sum of approximately £60 to the regular serving medical officer on full pay of the Royal Navy, the Army, or the Indian Army who in the opinion of the Prize Committee by professional work of outstanding

merit has done most to promote the study of naval or military hygiene. First consideration will be given to the authors of original articles or reports of investigations of value from the point of view of naval or military hygiene published in one or other of the various medical journals. Part authorship of any article will not be considered as justifying an officer to be recommended for this prize.

The Alexander Memorial Prize and the Parkes Memorial Prize are not open to officers on the staffs of the Royal Naval Medical School, the Royal Army Medical College or the Army School of Hygiene.

Recommendations should be sent in through the usual channels with copies of original articles or reports of investigations as required to reach the Hon. Secretary, R.A.M.C. Prize Fund Committee, R.A.M. College, Millbank, London, S.W.1, by December 31, 1946.

AIRBORNE MEDICAL SOCIETY

It has been decided to form a permanent Airborne Medical Society. Membership will be open to all Medical and Dental officers who have been entitled to wear the Maroon Beret. For information, write to : The Hon. Secretary (Guy Rigby-Jones, *M.C.*, *F.R.C.S.E.*), 63A, Belsize Park Gardens, London, N.W.3.

THE *Annual Dinner* of the R.A.M.C. officers (Regular, which includes officers holding Short Service Commissions) will be held at *Grosvenor House*, Park Lane, W.1., on *Wednesday*, May 21, 1947.

Obituary.

Mr. J. WILSON

It is with the deepest regret that we record the death of Mr. J. Wilson who passed away suddenly on October 20.

Mr. Wilson had been clerk to the Editor of the *Journal of the Royal Army Medical Corps* for some forty years. His service was practically continuous, being broken only by some three years absence while he served on the Sleeping Sickness Commission as personal clerk to the late Sir David Bruce.

He served with the following Editors : Lieutenant-Colonel R. H. Firth, Sir David Bruce, Sir William Horrocks, Colonel S. Lyle Cummins and the present Editor.

Few readers of the *Journal* realise how great was the service Mr. Wilson rendered to the Editorial Department. He was regarded as one of the most accurate proof-readers in London. During his long service he had acquired a wide knowledge of medical detail and was able to give a sound opinion as to the type of article that was acceptable although never obtruding his opinions. In all matters dealing with Copyright, the use of Proprietary Terms and the like, his knowledge and experience were invaluable.

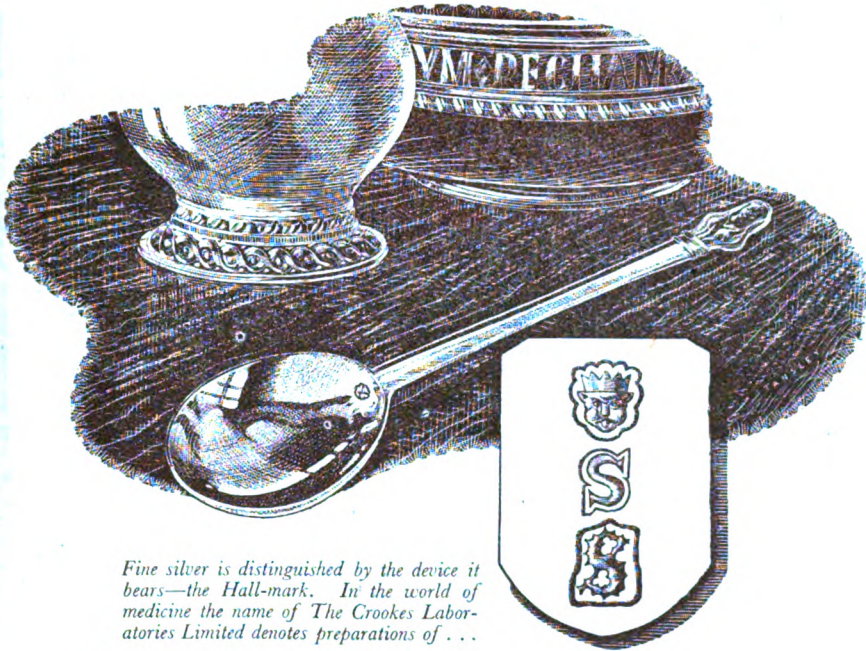
He was, by nature, a quiet, reserved and modest man and a model of discretion. It was with difficulty that he could be persuaded to talk of his recollections, but, under some friendly pressure, he had consented to put together a few of his reminiscences. This task was uncompleted at the time of his death.

Amongst his earlier memories was that, when a small boy, he used, on a Sunday morning, to accompany his uncle delivering milk to the Governor's house in the Millbank Penitentiary. On this site now stand, *inter alia*, the R.A.M.C. College and Mess, the Tate Gallery and Queen Alexandra's Military Hospital.

When he recently retired from his official work as a War Office Civilian Clerk, he remained as Editor's Clerk and his last work was to correct the galley proofs of the September Number of the Journal.

A man of spotless integrity, single-minded devotion to duty, unswerving loyalty with, at the same time, a quiet sense of humour, he was respected and held in high esteem by all who came into contact with him. The present Editor regarded him with considerable affection.

There has passed from our midst one with an unusual knowledge of the early days of the Corps which he served so loyally over so many years. It is all the more sad that he was looking forward to years of peaceful retirement.



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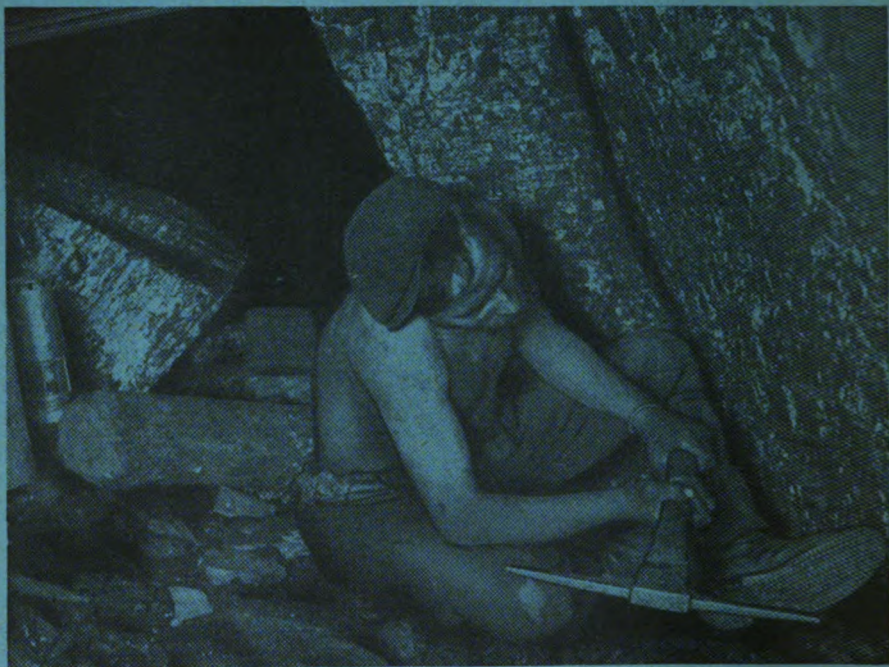
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Journal of the Royal Army Medical Corps.

Original Communications.

GAS-GANGRENE.¹

BY

G. HARDY EAGLES, M.D., D.P.H.,

Late Major Royal Army Medical Corps.

GAS-GANGRENE is an infection and clinical state associated with conditions in which severe wounds become infected through contamination with soil or dust. This happens in civil life to some extent, but is for the most part associated with states of war. The organisms responsible for the infection are derived originally from the gut of domestic animals where they carry on a harmless, saprophytic existence. When transferred in the course of nature, or by design as faeces in the form of fertilizer, they develop a resting or spore stage in which they are capable of existing for long periods of time in soil or dust. Consequently, when war is waged in an area of cultivated soil, gas-gangrene will occur in a certain number of the wounded, for these spores quickly germinate in wounds under suitable conditions, elaborate their toxins, destroy muscle tissue and eventually, unless suitable measures are instituted, cause a fatal condition. It is probable that the association of gas-gangrene and warfare dates from antiquity since man's association with domestic animals and with war has endured through the centuries. Although modern knowledge and scientific literature on the subject dates, in the main, from the war 1914-18, earlier descriptions of the sorry plight of the wounded in wars leave little doubt of the nature of many of the infected wounds.

During the recent conflict it was my duty as Specialist-Pathologist to study gas-gangrene in the field in the Italian theatre of war. With a mobile laboratory, especially equipped for this purpose, I was able to investigate these cases as they occurred in forward areas both as clinical cases and from a bacteriological and histological angle. During this period 104 cases were studied and it is from the experience gained in this I now wish to speak.

¹A lecture delivered to the Gesellschaft der Aerzte, Vienna, July, 1946.

In a series of this size, practically every type of case was seen varying from the mild to the severe and fatal ; from the apparently safe wound that remained uncomplicated by gas-gangrene to the apparently safe wound which terminated later in a fatal clostridial infection. Cases occurred from wounds from practically all areas of the body, thigh, buttock, calf, feet and toes, shoulder and back, head and neck, arms and hands and in the brain and retroperitoneal tissues. No muscle or group of muscles was found to be free from the possibility of gas-gangrene whether they were large or small or in any part of the body provided there was muscle damage and infection with the pathogenic anaerobes. Certain areas are known, however, to be potentially more dangerous. In this series 80 per cent of the cases resulted from wounds of the thigh and leg either with or without fracture. The remainder were about evenly distributed amongst other parts. The extent of muscle trauma is of great importance especially when associated with gross interference with blood supply and, for this reason, wounds with compound fractures accounted for a large number of cases.

Generally speaking, the clean-cut wound of high explosives is less likely to be the seat of gas-gangrene than those from mines because of the extensive muscle trauma of the latter. It is often held that the rich blood supply to the head in conjunction with the smallness of the muscle precludes the danger of gas-gangrene. In this series there occurred a case with a small scalp wound which, after wound toilet and closure, developed with great rapidity a generalized fatal gas-gangrene though the wound involved mainly the pterygoid muscle.

The terms " gas-gangrene " and " anaerobic myositis " are usually used synonymously. This implies that the infections of tissues other than muscle with pathogenic anaerobes belongs in another category. These organisms are capable of multiplication and producing toxin in tissue other than muscle, such as the brain and the optic nerve, and causing general symptoms indistinguishable from those arising from anaerobic myositis. It should be remembered that in the final analysis it is, as far as we know, the production of toxin and its effects on the body that is of prime importance ; the precise location of the focus is of importance from the standpoint of its recognition and eradication.

The number of cases in this series represents only a cross section of the total number of cases that occurred ; but it is certain that gas-gangrene had a considerably reduced incidence in this war when compared with the war of 1914-18. This would appear to be due to the type of warfare which led to a reduced number of seriously wounded ; to the organization of the medical services which carried conservative surgery into the forward areas ; to the shortening of the time-lag between wounding, efficient treatment and hospitalization and to increased knowledge of the condition and its treatment and prevention.

In the present series the time-lag between wounding and the appearance of clinical gas-gangrene varied from ten to seventy-two hours. This wide variation appears to have depended on a number of factors of which the most important were : the site of the wound, the extent of damage to the blood supply, the

time interval between wounding and wound toilet and the thoroughness and extent of that toilet, the use of tourniquets and tight dressings, the type of infecting anaerobe and the time-lag between wounding and the administration of prophylactic treatment such as penicillin, sulphonamides and antitoxin. The earlier these were carried out efficiently the smaller was the incidence of clinical gas-gangrene.

CLINICAL DIAGNOSIS.

The diagnosis is essentially based on the systemic reaction supported by bacteriological findings. In this series they were found to confirm each other.

It is not always possible to have at hand a laboratory equipped to carry out efficiently the necessary investigations, in the absence of which the diagnosis must be made on the local and general systemic condition of the patient. Histological examination is too lengthy a procedure to be of immediate value and should be reserved for studying specimens at leisure. Direct smears taken from the wound and stained by Gram's method require little time and have proved of value in confirming the clinical diagnosis and of giving a useful indication of the probable type of anaerobe involved. It must be remembered that the infection always begins locally and that it is often extremely difficult to decide from the appearance of the wound whether or not clostridial infection is present. If a direct smear reveals large numbers of Gram-positive rods suggestive morphologically of clostridia it should be assumed that a heavy infection with pathogenic anaerobes is in all probability present. Often these are the only organisms present in the smear. If the smear can be taken some distance from the actual wound their presence is indicative of a spreading infection. It is not possible to determine with anything approaching certainty the particular infecting anaerobe in such smears but a helpful indication may be given. Thick, short bacilli are characteristic of *welchii*, largish slender rods with a tendency to boat or leaf-shaped forms of *septicum* and larger curved forms of *oedematiens*. *Welchii*, in addition, does not spore in the wounds. Spore-bearing organisms may be *Sporogenes*, *histolyticum* or *tetanus* depending on the size and shape of the organism and the position of the spore. Particular attention should be paid to these patients as potential gas-gangrenes. In my experience it was highly desirable to keep them under more than usually careful observation and their evacuation delayed when at all possible.

THE CLINICAL PICTURE.

(1) *Local Signs*.—Local discomfort in a wound persisting in spite of all efforts such as bivalving the plaster or loosening of dressings and, occasionally, a more generalized discomfort not apparently related to the site of the wound with a feeling of heaviness or pain in the limb was suggestive.

Examination of the wound showed a striking appearance. The muscles had greyish sloughing surfaces, sometimes brick red and friable and greatly swollen and protruding from the wound. A thin discharge, browning in colour with fat droplets and gas bubbles and a characteristic odour were present. The skin surrounding the wound showed a greenish-red mottled appearance,

frequently with blebs. In some instances the muscle appeared dry and friable and gas was not obvious. It must be stressed that stinking wounds are not necessarily gangrenous. The typical odour is more a sweetish-sour unpleasant one such as is found in pure cultures of the non-proteolytic anaerobes. It is often said that merely to walk in a ward is sufficient to recognize by odour gas-gangrene infection in it. This is entirely fallacious. It is essential to remember that gas bubbles issuing from a wound or felt on palpation, though extremely suggestive, may indicate only that surgical emphysema is present or that the gas is confined to the subcutaneous tissue or to the intermuscular planes.

It will also be remembered that organisms other than *Clostridia* can produce gas in wounds and even in muscles, for example *anaerobic streptococci*. It is the whole picture of the wound that must be considered. When the muscles are cut they do not contract nor do they bleed when necrosis is established. Swelling of the muscle extending some distance from the actual wound was a common finding and is one of great importance. Such muscle was found to be infected with anaerobes in the majority of cases even though it contracted and bled.

GENERAL SIGNS.

The patients as a group presented an almost characteristic picture but this is one of degree and varied directly in relation to the extent of general toxæmia, from the mildly toxic case to the well-known and striking appearance of the severe and fulminating case. There was pallor with the slightly sallow, cyanosed tint which gave the complexion a greyish appearance. Drowsiness and apathy alternated with anxiety and an awareness of their surroundings amounting to acute apprehension with occasional manic symptoms. They slept badly and were without appetite. In early cases the pulse was rapid on a rising rate and out of proportion to the temperature which was often very little raised. The blood-pressure was reduced. As the toxæmia increased the skin became cold and clammy and greyish, the pulse-rate increased and the temperature fell. In fatal cases consciousness remained to a considerable degree until coma intervened.

A striking feature of gas-gangrene cases is their comparison with equally badly wounded but not gangrenous cases. The general collapsed picture has much in common with that seen in traumatic shock, but they are rarely confused because gas-gangrene usually appears after traumatic shock has passed off. The strikingly beneficial effects of blood transfusion in traumatic shock are never seen in true gas-gangrene.

BACTERIOLOGY.

The most importance is to be placed on the toxigenic anaerobes, *Cl. welchii*, *Cl. septicum* and *Cl. œdematiens*. Other anaerobes which may play a part are *Cl. bifermentans* (*Sordelli*), *Cl. histolyticum*, *Cl. sporogenes* and *Cl. fallax*. These are not toxigenic, or less so, but their presence may be important in that they destroy muscle and thereby when growing in symbiosis with the

toxigenic anaerobes enable them to grow more rapidly and to produce more toxin by supplying them with a suitable medium in which to multiply. The wound itself usually shows a mixture of several anaerobes and aerobes. Specimens taken from the advanced area of infection gave only one anaerobe in most cases but in a number more than one was found. In those with a mixture of pathogenic anaerobes and especially when *Cl. histolyticum* was present the infection is particularly severe with a high mortality. *Cl. welchii* was found to be responsible for 66 per cent of the cases, *Cl. septicum* for 14 per cent and *Cl. oedematiens* for 9 per cent. The remaining 12 per cent were of mixed infection or in which anaerobes could not be isolated in pure culture.

For identification of the anaerobes specimens were inoculated into Robertson's meat medium and by direct muscle smear on human blood-agar plates which were incubated anaerobically and aerobically. From the anaerobic plates suitable hæmolytic colonies were picked and transferred to peptone water containing a strip of sterilized iron. These were incubated aerobically and when pure were used to inoculate fermentation tubes with suitable range of sugars again containing iron strip, and to milk and gelatin. The use of iron strip as a reducing agent is excellent since the most fastidious anaerobe will grow copiously when this is added to the medium and incubated aerobically. Further identification was carried out using the Nagler plate method with Fildes peptic digest medium and with plain agar enriched with plasma from certain samples of human blood. The typical reaction of the lecithinase on lipoprotein in the medium was obtained and its inhibition with suitable specific antitoxin. The hæmolysin test of Hayward was also employed. In this test a culture of the organism is added to a volume of 3 per cent human red cells with controls containing appropriate antitoxin. The production of hæmolysis and its inhibition by specific antitoxin at 37° C. is used to differentiate the organisms.

PATHOLOGY.

In muscle taken at biopsy two types of general histological reaction were seen. In mild cases there was a superficial area of necrosis in which bacteria of various kinds including large numbers of clostridial forms abounded. Adjacent to this was an area of polymorphic infiltration and beyond this band an area of congestion and œdema but the muscle fibres appeared fairly normal. In severe cases the necrotic area was similar to that seen in the mild cases but the adjacent tissue showed very little polymorphic infiltration. The muscle fibres in this and a wide area adjacent to it were severely damaged as evidenced by wide separation of the fibres, alteration in staining reaction and degenerative nuclear changes. Many of the fibres were practically destroyed. This extended into an area of intense congestion with swelling of the muscle and dilatation of the capillaries and hæmorrhage. Thromboses were common and fat droplets seen frequently. In mild cases the bacterial invasion appeared to end with the area of polymorphonuclear zone but in the severe cases the *clostridia* invaded beyond this zone and came to lie between the muscle fibres even as far as apparently healthy muscle. It was in this location that *Cl. septicum* was more commonly encountered. This is not surprising in view of

the fact that it is motile and more capable of invading healthy tissue. It becomes apparent, therefore, that congested muscle which contracts sluggishly even though it bleeds is almost certainly infected in true gas-gangrene and must be dealt with by surgery or other local treatment. This is particularly true of *septicum* infections.

TREATMENT.

There is no known method by which it is possible to determine with certainty the ultimate course of a gas-gangrene infection when seen in its early stages for mild cases, and even wounds not considered potentially dangerous, may develop into severe and fulminating cases with amazing rapidity. The potency of the toxin produced and the resulting damage to tissue appears to be the deciding factor in determining the rate of spread and the degree of systemic reaction. It is well known that the pathogenic anaerobes vary widely both as to the particular organism and amongst strains of the same organism in the amount and potency of the toxin produced and that can only be determined by isolation and prolonged study of the organism. Speed and effectiveness in treatment is, therefore, essential.

Whenever possible tourniquets should be avoided. At the earliest possible moment the wound toilet should be carried out and preventive measures instituted. In this series of cases it was demonstrated by comparison with a series of so-called dirty wounds of the potential gas-gangrene type that gas-gangrene could for the most part be prevented if adequate surgery were carried out in the potential cases in combination with adequate doses of penicillin, gas-gangrene antitoxin and the application of penicillin and sulphonamide to the wound locally. These should be persisted in until the wound is granulating.

In established gangrene treatment must be on heroic lines involving complete removal of a muscle or a group of muscles or amputation of a limb. At the same time combined penicillin, sulphonamide and antitoxin therapy must be carried on until the area is clean and systemic reaction has subsided. The earlier in the case this has been done the more favourable has been the outcome. At all times the extent of the treatment must be gauged in terms of the clinical picture. Tight bandages and plaster dressings must at all times be avoided and the patient kept under constant supervision.

Penicillin and sulphonamide are in no way substitutes for antitoxin for their mode of action is quite different. Neither penicillin nor sulphonamide possess any power to neutralize toxin. Their action is directly on the bacteria and either interfere with their growth and metabolism or actually destroy them. It is, therefore, not to be expected that they could replace antitoxin whose action is to neutralize the formed toxin.

Local measures are of great importance when chemotherapy is employed especially in the early stage of infection. Practically all war wounds show a mixed bacterial infection with anaerobes and aerobes and their combined action is important. It is well known that in experimental gas-gangrene the spread of the anaerobic infection is greatly increased by the presence of pathogenic aerobes. McClean and Rogers (1944) point out this effect when capsulated

hæmolytic *streptococcus* and *Cl. histolyticum* are combined in infections in guinea-pigs. The local application of penicillin and the sulphonamides reduces or inhibits this interaction. Chemotherapy parenterally can only be expected to be effective when circulation to the infected area is adequate. When a main artery is severed and no collateral circulation is present the infection, unless prevented from doing so locally, will spread at least as far as the point where circulation is established and consequently as far as the area reached by the circulating drug. The position where the spread of toxin and its neutralization by antitoxin is concerned is not clear for it is not known to what extent the toxin is disseminated by lymph drainage.

In a certain proportion of cases no treatment or combination of treatments is successful. It remains a matter of concern both clinically and scientifically that the results of antitoxin therapy are not more satisfactory for, although our knowledge of the nature of the gas-gangrene toxins and their mode of action is far from complete, it is assumed on quite good evidence that the clinical manifestations are due to the action of the toxins on the body tissues. All the pathogenic anaerobes produce a toxin which is hæmolytic and lethal for experimental animals. The antitoxin is specific for each toxin. In *Cl. welchii* alpha toxin, which is known to be an enzyme (lecithinase), appears to be the most important of the toxic factors which compose this complex toxin. Another enzyme, hyaluronidase is produced by *Cl. welchii*, *Cl. septicum* and *Cl. œdematiens* but its effect is apparently confined to facilitating the spread of the infection locally. Although a small amount of lecithinase is produced by *Cl. œdematiens*, sufficient to elicit the Nagler plate reaction, very little is known about the toxins of either *Cl. œdematiens* or *Cl. septicum*. No true indication is to be gained of the infecting anaerobe or its toxin by the clinical picture of the patient for all gas-gangrene patients show the same evidences of toxæmia, acidosis and circulatory involvement, apparent differences being largely a matter of degree. This is not surprising when the infection is with more than one of the pathogenic anaerobes, but even when the infection is a single one the same clinical picture is found. Nor is any true guide to be found in the appearance of the muscle at the site of the infection, as to the nature of the anaerobe involved or its toxin, for the distinguishing signs of a gas-gangrene infection are common to all. Of the single anaerobe infections *Cl. welchii* is most frequently encountered and, although it is known on animal titration that *Cl. welchii* antitoxin completely neutralizes alpha toxin, the results following the administration of *Cl. welchii* antitoxin in known *welchii* infections is no better than is met with in either *Cl. septicum* or *Cl. œdematiens* when their corresponding antitoxins are used. It may be, then, that the gas-gangrene toxins possess some toxic substance not yet discovered which is produced locally during the infection and which is not neutralized by the antitoxins. The production must necessarily be local in origin since the antitoxins completely neutralize the toxins prepared *in vitro*, unless it is to be assumed that the action of the toxins in man is essentially different from that in animals. The muscle shock factor, adenosinetriphosphate described* by Bielschowsky and Green (1943) is interesting in this respect. This substance, isolated from

extract of muscle, which produced symptoms similar to ischæmic shock and can kill animals when injected parenterally, may throw some light on the lethal factor in gas-gangrene since extensive muscle damage is a characteristic of that condition. It could, however, be only an explanation in part since the same clinical state would occur in all non-gangrenous wounds with extensive muscle damage and especially in those showing extensive areas of ischæmia. But this is not the case. Nor is the same toxic manifestation to be found in cases where extensive muscle destruction results from infection with the non-toxic anaerobes. The work of Evans (1945) has shown that the action of alpha toxin is the major and perhaps the only factor in the death of guinea-pigs from *Cl. welchii* infections. His experiments were not designed to distinguish between circulating toxin and the possibility of toxin acting locally and liberating another toxic factor from the damaged muscle. His conclusion that it was reasonable to postulate that the dose of antitoxin which would protect animals against death was one which produced in the circulation a concentration which ensured that the amount of antitoxin which passes into the infected area is sufficient to neutralize completely the toxin liberated by the proliferating organisms, is in accord with our knowledge of the toxin and antitoxin *in vitro*. He states, further, that the guinea-pigs showed an immediate improvement after administration of antitoxin which suggests that the symptoms were in part, at least, due to circulating toxin. The same improvement is frequently met with in human cases following the administration of large doses of antitoxin but it is rarely maintained if the gangrenous muscle lesion persists. It is a matter of general agreement that the local infection must be eradicated to ensure any reasonable hope of recovery. For this reason surgical removal is still considered the most important single form of treatment though rarely is it so utilized since the urgency of the condition demands a combination of all means of combating the infection at our disposal.

At post-mortem evidence of fat embolism is frequently encountered. It is, however, not confined to gas gangrene and can be demonstrated where death has followed extensive muscle damage or fracture of the long bones. It is more likely, therefore, to constitute a complication rather than being pathognomonic of the infection.

Further knowledge of the action of the gas-gangrene organisms and their products on body tissue both locally and generally, if we are to make advances in our understanding and treatment of this condition, is essential.

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CONDITIONS EXPERIENCED AS A JAPANESE PRISONER OF WAR FROM A MEDICAL POINT OF VIEW.

BY

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[Written September 5, 1945.]

NORTH POINT CAMP, HONG KONG, JANUARY TO APRIL, 1942.

NORTH Point Camp was situated on the Island of Hong Kong, about two miles to the East of Lyeman Gap on the water front.

The Camp consisted of a number of wooden huts originally built for the housing of Chinese internees.

The Japanese landing on Hong Kong Island occurred in this area and, as a result, the huts and other buildings were considerably damaged by shell fire.

The whole of the "Stanley" garrison was, in January, living in the Camp, consisting of about 3,000 British, Canadian and Indian troops.

Sanitary conditions were unbelievably bad. During the fighting in Hong Kong, it appeared that the area had been used as a rubbish dump first by the British and later by the Japanese who had also stabled horses in the Camp.

A mass of rubbish, six feet high and covering an area of several hundred square feet, was deposited outside the Camp. The whole area was thick with flies, whilst the latrines and wash-houses were still choked with faeces in spite of continuous cleaning operations.

Water was being drawn from a stream a short distance from the Camp.

Living accommodation was primitive, the men being crowded into huts already damaged by shell fire.

These huts, designed to accommodate thirty or forty men, were in several cases occupied by as many as a hundred and twenty.

For the first three weeks the diet was good, permission being granted by the Japanese for parties to collect food from R.A.S.C. dumps on the Island. At the end of this period, however, supplies ran short, partly due to the fact that the Japanese ordered the removal of all stocks in Camp. The diet then consisted of rice, vegetables and fish. Quantities were adequate but skill in the preparation of Oriental food had not, in those early days, been achieved.

A fair quantity of medical supplies were found in the camp, whilst, during the first few weeks, it was permitted to take seriously ill cases to the British Military Hospital, where urgently needed drugs could still be obtained.

Efforts were made to combat the latrine and fly problem. The camp was eventually put into a state of comparative cleanliness and attempts made at the control of flies by killing and trapping. Gauze cone type fly traps were constructed from odd materials available. These were a great success, flies being caught in them and measured, when killed, literally by the pint.

It was found impossible to fly-proof the huts owing to lack of material and to the severe damage sustained during the fighting. Difficulties were also encountered in the fly problem by the fact that it was not possible at first to send working parties to clear the rubbish outside the camp area.

Towards the end of January, the British troops were transferred to another camp and were replaced by personnel of the Royal Navy and the remaining Canadian Units in Hong Kong.

The commonest sickness seen by the writer at this camp was dysentery. Diarrhoea was practically endemic.

For the first two or three weeks it was possible to send severe cases to hospital but, after this time, orders were received from the Japanese that a hospital must be formed in the camp.

A small warehouse in the area was taken over, and the dysentery cases treated in this.

The treatment of dysentery was hampered by the lack of nursing facilities and by overcrowding. The hospital was made to accommodate about forty men lying side by side on improvised beds. Little could be done in the way of special diet.

No diagnostic facilities were available but the majority of cases appeared to be of a bacillary nature.

The onset was sudden, consisting of a feeling of malaise accompanied by rigors and hyperpyrexia, the temperature rising to over 103° F. Diarrhoea commenced about six hours later and was accompanied in many cases by severe vomiting and collapse. The stools, often as many as thirty or forty a day, consisted of pure blood and mucous.

No deaths occurred in the camp during the writer's stay, but it is recorded that two severe cases evacuated to British Military Hospital died there.

The following drugs were available for treatment : Magnesium sulphate in fair quantity ; Sulfapyridine—about 500 tablets ; Sulfanilamide—about 3,000 tablets.

Mild cases were treated with two hourly doses of magnesium sulphate until the stools became clear of blood. This usually occurred by the third or fourth day, the patient being then discharged to make room for more serious cases. Few relapses occurred and the results were considered good.

Severe cases were given from four to six grammes of sulfapyridine. The effects of this drug were in most cases dramatic, the stools often becoming firm and clear of blood in twenty-four hours and the patient apparently cured in forty-eight hours.

By February, 1942, the supplies of magnesium sulphate and sulfapyridine were exhausted and all cases were treated with sulfanilamide. The results were surprisingly good, most cases recovering in two or three days.

Those cases which did not seem amenable to treatment and which passed foul smelling stools of a bloody faeculent nature were thought to be amoebic in nature. A small quantity of emetine hydrochloride and emetine bismuth iodide was available and given as a therapeutic test. The results of treatment

appeared satisfactory although it was not possible to give a full course of the drug.

The writer did not remain at the camp long enough to assess the relapse rate of these cases.

No other serious illnesses were seen at this camp by the writer, but it is reported that beri-beri and diphtheria became a serious problem in the camp during the summer of 1942.

General treatment by the Japanese was fairly good during these first three months. There appeared to be little interference with individuals. Sanitary conditions and overcrowding were the worst features of the camp, whilst the low vitamin diet suggested that deficiency diseases would become common in a short time.

At the time of the writer's transfer to another camp a few cases of beri-beri had already been diagnosed.

From the point of view of living conditions, this was the worst camp seen by the writer. From a medical point of view; however, a fair quantity of drugs were available and very serious cases could be evacuated to hospital.

The writer saw no instances of ill-treatment at this camp, the Japanese being guilty of neglect rather than actual misuse of prisoners.

ARGYLE STREET CAMP, APRIL, 1942 TO APRIL, 1944

Argyle Street Camp was situated on the mainland of Hong Kong, about a mile from Kai Tak Airport.

It consisted of a number of wooden huts originally built for the housing of Chinese internees.

There was little fighting in this area during the hostilities in Hong Kong and the camp sustained no damage. Sanitary and living conditions were fairly good, the only drawback being that of overcrowding for the first six months. The average number of men in a hut was forty, but as similar huts in North Point had accommodated a hundred and twenty, there was no real cause for complaint.

Latrines were of the Asiatic type, but were flushed by running water. Shower baths and ablution benches were in good order.

The Camp housed between 500 and 600 officers and 100 other ranks as cooks and batmen. The numbers were gradually reduced during 1942 and 1943 by drafts for Japan to about 450.

In April, 1942, the Camp was organized as an Officer's P.O.W. Camp.

All senior officers were transferred in August, 1943.

The diet at this camp was poor. The principal foodstuff eaten was white rice, the quantity varying during the two years of the writer's stay from about 700 to 375 grammes a day. The latter figure was that issued at the time the writer left the camp in April, 1944.

During the first year, bread was baked daily in addition, the quantity being in the region of about 200 grammes.

Meat was available for the first few months of 1942 only.

Green vegetables, occasionally potatoes, Japanese radishes (daikons) and other root vegetables were issued in a quantity sufficient to supply vegetable soup with the rice twice daily. On many occasions, the vegetables consisted of such things as potato or chrysanthemum tops.

In addition to the above, peanut oil was issued fairly regularly.

Fish, sufficient to supply each man with a ration every ten days, was also included in the diet.

Every effort was made to preserve the vitamin content of the food in cooking. Vegetables were cooked for a short period only, whilst, in spite of complaints from many personnel, the practice of frying food was discouraged. It was submitted by the medical officers in the camp that the fish was better distributed to many men in small quantities than that each man should be given a large and probably indigestible ration at long intervals. Medical recommendations were all made in an effort to control the amount of deficiency disease in the Camp.

In many cases the suggestions made were unpalatable, but were accepted and adhered to by the messing officer. There was no interference by the Japanese with the method of preparation of the food. This was a great advantage compared with the prison camps in Japan where complete control of messing was exercised by the Japanese.

The caloric value of the diet was at one period (June, 1942) as low as 1,400 per day, and seldom exceeded 2,000. The latter figure takes into account canteen purchases and Red Cross issues.

In June and July, 1942, the Camp was under punishment owing to officers having escaped and no bread and no canteen were permitted. The caloric value of the diet at this time was about 1,400, calculated on weight of uncooked food.

Officers were paid according to rank and were allowed to purchase extra foodstuffs and necessities from the canteen. During 1942 the prices were reasonable and the diet could be supplemented to a fair extent. In 1943, however, prices became exorbitant and it became increasingly difficult to augment the diet to any extent. It is considered, however, that, without the canteen, malnutrition would have been much more severe than it was and that the spending of the Japanese pay on foodstuffs was absolutely necessary for the preservation of health.

In addition to the purchase of foodstuffs, money was sent regularly to the other ranks camp at Shamshuipo where malnutrition was severe.

Red Cross parcels to the scale of one per man were received in November, 1942, together with some bulk supplies of M. & V. ration, atta, ghi and cocoa. The latter were used to supplement the diet and lasted until about April, 1943. Further Red Cross parcels to the scale of one to five men were received in April, 1943. No other Red Cross supplies were received in the Camp up to April, 1944, when the writer left.

That the Red Cross food was instrumental in preserving the Camp at a very critical time was indicated by the sudden fall in the figures of malnutrition at

this period. The number of cases reporting sick showed a steady increase again after April, 1943.

A medical committee from the 12 M.O.s in the camp was organized. This committee received reports on the state of the camp health from M.O.s in charge of personnel and hospital, and made recommendations and suggestions to the administrative authorities.

The organization of the Camp differed from that of camps in Japan in that there was little or no interference by the Japanese with internal administration. This was a great advantage from every point of view as the writer came to realize on arrival in Japan.

During the first five months of the Camp's existence the Japanese refused to provide facilities for a camp hospital. During this time the sick were treated in their own huts. This was a great hardship, especially in the case of men with dysentery. On rare occasions a seriously ill patient was transferred to British Military Hospital, but in the majority of cases requests for transfer to hospital were ignored.

No officer or man died in the camp during the period April, 1942 to April, 1943, but four officers died after removal to hospital.

In the writer's opinion at least two of the deaths could have been avoided by immediate removal as requested.

One case was that of fulminating dysentery, transfer delayed twenty-four hours, and one that of obstruction of the bowel, transfer delayed twenty-four hours.

The other two deaths were registered as (a) cirrhosis of the liver and (b) carcinoma of the stomach.

Although the death of the latter cases were inevitable, it may be noted that removal was delayed for over two months in each case, and the patients might have been spared much misery by civilized hospital nursing.

In October, 1942, an outbreak of acute gastro-enteritis occurred in the camp and appeared to be due to fish poisoning.

Four cases showed symptoms of a choleric nature and the diagnosis of cholera was made by the Japanese by bacteriological methods. This outbreak disturbed them sufficiently to open a camp hospital. The equipment issued for this hospital was primitive but beds and other essentials were obtained in the course of time. There were no deaths as a result of the "cholera" outbreak, and no further cases occurred.

A small quantity of medicine, totally inadequate to the needs of the camp, were issued by the Japanese monthly. No drugs were issued in the months July, August, September, 1942. Medicines issued consisted of such things as iodine, aspirin, magnesium sulphate, sodium bicarbonate, a small quantity of sulfanilamide or sulfapyridine, and a small quantity of vitamin B. The latter was usually sufficient to treat about 10 per cent of the sick needing it.

Medical supplies were supplemented by bribing guards to buy them in the town and by their being sent in parcels. This latter source of supply was eventually stopped by the Japanese. A large proportion of the money paid to officers was used for the purchase of necessary medicines. In this respect

the camp owes a great debt to Dr. Selwyn Clarke, Director of Medical Services, Hong Kong, who was able to send to the camp many valuable drugs in the year 1942.

The transfer of acute surgical cases to hospital was invariably refused. An operation room, however, had been fitted up in the Indian Soldiers Prison Camp about half a mile away and operations were carried out there. Patients were transported to and from the operating room by stretcher; the Surgeon, Assistant and Anæsthetist acted as stretcher bearers. The Surgeon stated that his surgical technique was hardly improved by his having to undertake the preliminary carriage of the patient. About four perforated peptic ulcers and a similar number of appendicectomies were performed under these conditions. All the patients made an uneventful recovery. In the case of one officer with a perforated ulcer, transfer even to the operation room was refused and the procedure carried out successfully in the camp dental room instead.

After October, 1942, it was possible to treat serious medical conditions in the camp hospital.

The Japanese medical officer paid periodic visits to the camp, generally at about six weekly intervals, for the purpose of selecting cases for transfer to British Military Hospital. He seldom proceeded farther than the main gate, however, where he would state that perhaps four cases out of the seven suggested to him might go.

This officer seldom examined a case personally and, in the case of a sick medical officer, his refusal to allow transfer to hospital was immediate and firm. It is considered that Lieutenant (later Captain) Saito did little to alleviate the conditions of health at this camp and that his attitude to sick men was that of complete indifference to their well-being. No opportunity was given to assess his skill as a medical officer, as he avoided at all times any contact with the sick.

Summary of Diseases seen at Argyle Street Camp.

DYSENTERY AND DISEASES OF THE BOWEL.—Dysentery, both amœbic and bacillary, was fairly common during the first few months. Sporadic outbreaks of gastro-enteritis also occurred from time to time and were traceable to dietetic causes. Two or three cases of enteric were suspected. Four cases of cholera were suspected and diagnosed as such by Japanese bacteriological methods. One death from dysentery occurred after removal to hospital.

Dysentery cases were treated by the administration of sulfapyridine or sulfanilamide. Owing to the shortage of supplies the average quantity given per case was about 4 grammes over a period of two or three days. Symptoms were controlled in twenty-four hours, but the lack of further treatment probably resulted in many carriers of the disease being released in the camp.

The fact that sporadic cases constantly occurred in a reasonably hygienic camp was no doubt due to this reason.

A few cases of amœbic dysentery were diagnosed on clinical grounds. A supply of emetine bismuth iodide was available and fairly adequate treatment given.

DIPHTHERIA.—There was a small outbreak of diphtheria in late 1942. About four mild cases occurred. There had already been serious outbreaks of the disease at Shamshuipo and North Point Camps and a supply of antitoxin was available. The Japanese investigated the outbreak, sprayed everyone with carbolic, issued orders about the wearing of face masks and isolated contacts and carriers. No complications nor deaths occurred.

TROPICAL ULCER.—It was noticed that during the summer months prisoners who sustained slight cuts or scratches on the leg showed a marked resistance to healing. In the case of many the injured area became acutely inflamed, a small vesicle formed at the site and later broke down into a spreading indolent ulcer.

These ulcers were very resistant to treatment. They consisted of a necrotic base with irregular edges. The surrounding tissues were friable and unhealthy in appearance. In a few cases there was a tendency to spread round the leg. No loss of limb or permanent damage resulted however. It was thought that this condition was in the nature of "tropical ulcer," and that lack of some vitamins, possibly B and C, was a contributory factor.

In one case the possibility of diphtheritic infection was suspected as the patient had been diagnosed a carrier by the Japanese.

Treatment consisted in what local applications were available. Cases seemed to do best with local sulfanilamide powder and also with the application of a solution of Japanese neoarsphenamine. The latter was not tried intravenously owing to shortage of supplies and lack of adequate facilities for sterilizing or distilling water.

MALARIA.—Few cases of fresh malarial infection occurred in the camp, but a large number of chronic cases who had become infected previous to captivity were treated. Supplies of atebirin and plasmoquin were scanty, whilst quinine was not abundant. It was found possible to give only a very small percentage of cases an adequate course of treatment. Of necessity, the majority of cases were given only enough quinine to control the symptoms. Relapses were frequent but by April, 1944, very few cases were occurring, the disease apparently having become quiescent or cured in most cases.

MALNUTRITION.—During the years 1942-1944, the prisoners at this camp appeared to be living on the verge of deficiency disease. A large percentage of those in the camp actually reported sick with symptoms, but only a small percentage progressed to serious illness. This was, in part, due to the fact that all prisoners were encouraged to report sick at once if they suspected beri-beri or pellagra.

Supplies of thiamine and nicotinic acid presented by the Japanese were negligible but these were augmented by bribing guards. A supply of thiamine powder was obtained from outside early in 1942; this was made up as needed into a solution for injection. A small quantity was still available when the writer left in 1944. Much was to be desired in the method of sterilization of this drug, but no infection, abscesses or other ill-effects were seen.

ŒDEMA (BERI-BERI).—The majority of cases reported with œdema of the ankles. No cases of severe scrotal œdema or ascites were seen.

Treatment consisted of about 10 milligrammes of thiamine (3,300 units) by intramuscular injection on alternate days. The average number of injections was three. Diuresis usually occurred after the second injection and most cases showed no signs of oedema after three injections.

The rapid response of these cases to treatment is considered due to the fact that they were seen early. Cases seen later in Japan were nearly all of a chronic nature and required much larger doses of thiamine for longer periods. With regard to dosage, it must be noted that it could not be assessed with accuracy, as the scales used for weighing out the drug were not of the best.

NEURITIS (BERI-BERI).—A few cases of painful feet, peripheral neuritis and arterial spasm were treated. Similar doses of thiamine were given but for longer periods. Results of treatment were good. One case was seen in which the patient complained of girdle pains followed by numbness of the legs and paralysis. He appeared to have signs of an upper motor neurone lesion and was very resistant to treatment. He was eventually sent to hospital and his subsequent progress is unknown.

PELLAGRA.—Several cases of classical pellagra were seen. Patients first complained of a sore tongue followed by scrotal eczema and the appearance of a dry scaly rash. No dementia occurred.

The only drug available was Japanese Nicotinic Acid (Apellagria) obtained by bribing the guards. No official supplies of this were ever obtained. It was found that the best results were obtained by making up a solution and giving 25 milligrammes by intramuscular injection. The procedure was painful but effective. Three injections resulted in a cure in most cases. The drug by mouth necessitated large dosage to be effective. It is thought that this preparation was not pure nicotinic acid.

The usual effects of the drug, namely abdominal pain and hot flushes, were experienced by most of the patients.

ARIBOFLAVINOSIS.—A large number of suspected ariboflavinosis cases were seen. Patients woke up in the morning complaining of a sore tongue. On examination a small ulcer was sometimes detected on the tip or sides. In the course of two or three hours the surface of the tongue became acutely painful and the epithelium peeled off leaving a bright red strip about one centimetre wide down the centre of the tongue. The mucous glands and papillæ appeared engorged. By the evening the patient also began to complain of an aching pain in the throat with difficulty in talking and swallowing.

Examination at this time would show the tongue to be completely stripped of its mucous membrane, whilst the lymphoid follicles on the posterior pharyngeal wall were very red and enlarged. Patients also showed a fair degree of conjunctivitis and rhagades at the corner of the mouth by the second day.

A small quantity of milk, tomatoes and eggs were sometimes available for the treatment of sick. These, together with thiamine and nicotinic acid, were given. Progress was rapid, most cases showing improvement in two or three days. A large percentage, however, whilst showing an improvement in the acute pharyngeal condition continued to complain of a sore tongue. On examination, the organ had an appearance similar to that in sprue. Scrotal

eczema, accompanied by the loss of a serous exudate, was also a common feature. An attempt was made to obtain some idea of the ætiology of these cases by treating some with nicotinic acid and some with thiamine. The results were inconclusive, but it seemed that the chronic cases showed a marked improvement when given thiamine, whilst acute symptoms seemed to be improved with nicotinic acid. The best results seen were when the drugs were combined with tomatoes, eggs and marmite, a small quantity of which had been purchased through the canteen. It should be noted that all supplies of marmite were turned over to the medical staff as a medicine.

A large number of cases of the above type were seen and treated (including the writer himself). Results of treatment, although impossible to assess with scientific accuracy, seemed to indicate that multiple vitamin therapy was the best treatment, and that the lack of a particular complex made its appearance at different stages of the disease. The possibility of some linkage and interdependence of the vitamins might be considered.

Very few of such cases were seen by the writer later in Japan, where supplies of riboflavin were available, but the indications were that lack of this complex played a large but not complete part in the symptomatology.

DISEASES OF THE EYE.—Towards the end of 1942, it became evident that prisoners were suffering from poor vision as the result of malnutrition. An eye clinic was organized.

Examination of cases indicated that the condition was a retinitis. Symptoms were those of failing distant vision and an inability to see the complete word on the printed page. Examination of cases demonstrated a reduced visual field with scotomata for red in particular at first. The retina was hyperæmic and the discs pale. Signs of optic atrophy were seen in a few cases.

Treatment consisted in general vitamin therapy, it being found that thiamine arrested the progress of the disease and in many cases caused a marked improvement. These cases of defective vision formed the largest and most serious group of the diseases encountered at Argyle Street. At the time of the writer's departure in 1944 about 25 per cent of the personnel had a more or less severe degree of retinitis. Frequent appeals to the Japanese for medicines and a better diet were ignored.

GENERAL REMARKS.—The general standard of health and treatment at Argyle Street Camp was better than in Japan or at other camps in Hong Kong. The diet was poor, however, and medical arrangements not unsatisfactory. In 1944, the average health of the prisoners was fair except for the presence of retinitis in about 25 per cent. The whole camp, however, was on the verge of beri-beri and pellagra, there being a constant turn over of cases reporting sick. The situation was never entirely under control but was greatly alleviated by the fact that a small quantity of eggs was obtainable from the camp farm for the sick, and by the unselfishness shown by third nationals in Hong Kong, who made great sacrifices to send weekly food parcels into the camp.

From a medical point of view the most interesting aspect of the conditions seen was the early symptomatology and results of treatment of deficiency disease. It must be noted that little in the way of hard physical work was done by the prisoners except for camp details. This was no doubt an important factor in the fairly satisfactory health conditions compared to other camps.

In this respect it was clear that those officers who took reasonable exercise enjoyed the best health. Those who spent most of their time in bed and also those who did too much in the way of physical work seemed to show symptoms of beri-beri more frequently. It appeared evident that a reasonable amount of exercise was necessary to metabolize the food and absorb what little vitamins it contained.

It was also noted that an increase in the intake of white rice, without a corresponding rise in the consumption of more vitamin-containing foods, resulted in symptoms of beri-beri becoming evident. A happy medium both in diet and work seemed the best solution to the problem and in the course of time many individuals were able to achieve this.

From the point of view of acclimatization to the diet, it was found that the loss of weight was rapid in the first few months. Acclimatization was then followed by a slight gain, after which the individual remained fairly stable unless some other illness overtook him. Such a mild condition as an attack of malaria or diarrhoea, however, resulted in a rapid loss of weight out of all proportion to the seriousness of the illness concerned.

In general, it was noted that the short stocky type of individual was more adaptable both mentally and physically to the diet. Tall, bulky men seemed to take longer to become acclimatized, and suffered more from general debility and weakness on recovering from diarrhoea.

JOURNEY BY SEA FROM HONG KONG TO JAPAN.

In April, 1944, the writer was one of a party of ten medical officers who were transferred from Hong Kong to Japan. The party was transferred from Argyle Street Camp to Shamshuipo Camp where a draft of ten medical orderlies and two hundred other ranks was made up.

The draft was isolated for a period of two weeks at Shamshuipo Camp, Hong Kong, during which time inoculation against typhoid, dysentery and cholera was carried out, together with stool tests. The latter consisted of inserting a glass rod into the rectum and rubbing it over an Agar (?) plate. The results were presumably cultured and examined as we were told later in Japan that one of the men (name unknown) was a cholera carrier.

The draft of 220 officers and men were transferred to a Japanese transport on April 29, 1944. They were accommodated in the rear hold of the ship, one deck below the main deck.

This hold was unbelievably filthy and, in addition to prisoners, carried a cargo of dried fish and soya. During the whole trip the area was infested with flies. During fine weather it was possible for all the men to lie down, but the centre of the hold was not rain proof and, during the heavy

rain storms encountered on the voyage, a number of the passengers had no dry place to sleep. Accommodation for sleeping was provided for about 150 men on wooden galleries built round the sides of the hold.

Two meals of rice, dried fish and putrid meat were served daily. Quantities were adequate. Two tins of corned beef were allowed each man for the whole trip which lasted fourteen days.

Tea, about half a pint per man, was issued twice daily. For the first three days drinking water was difficult to obtain. At that time the ship was on a southerly course and the heat in the hold was considerable. Men were allowed on deck for half an hour, morning and evening. On the second and third days several men collapsed and the allowance of water was increased to about a pint a day. Representations to the Japanese also resulted in permission being granted for half the draft to sit on deck during the day after the ship left Formosa on about May 3.

A few drugs were supplied to the draft before leaving Hong Kong, these were supplemented by "private purchase."

During the journey several men suffered from malaria whilst diarrhoea and dysentery was epidemic by the end of the journey. No provision whatsoever was made for the care of the sick. No deaths occurred however.

The ship was one of a convoy of six. In addition to prisoners a number of Japanese sailors and soldiers were carried. The ship was not marked in any way to indicate that prisoners were on board. No incidents due to Allied submarine action occurred.

The prisoners disembarked at Moji, Japan, on May 13, after a journey of fourteen days.

It may be remarked that this journey was made in comfort compared with other drafts sent to Japan.

SHINAGOWA, P.O.W. HOSPITAL, TOKYO, JAPAN.

[*May, 1944 to August, 1945.*]

DESCRIPTION OF HOSPITAL.—The hospital was situated on the outskirts of Tokyo to the south of the City.

The surrounding area, whilst not heavily industrialized, had the following objectives in close proximity to it: (a) A Naval training school within a distance of half a mile; (b) Several small factories and shipyards within the same radius; (c) Immediately adjacent to the hospital was an aircraft detector (?) or searchlight generator, manned by about thirty soldiers.

The hospital itself occupied part of an island about half a mile square. This island was bounded to the East by the sea and on the other three sides by canals. It consisted of a series of wooden barracks reported to have been constructed originally for Korean labourers. They consisted of an administrative block and five huts or barrack buildings. The walls consisted of two layers of thin boarding with a space of four inches between. Each barrack was partitioned off into two bunks accommodating three or four officers or orderlies and four rooms, each capable of housing up to twenty patients. The floors were raised about a foot from the ground and were covered with

the standard Japanese straw mats known as "Tatami." The rooms were well lighted along one side by sliding windows. On the other side, a corridor ran the length of the barracks.

During the winter of 1944-45 there were no heating arrangements except for a charcoal brazier in one of the rooms housing pneumonia cases.

At the end of each barrack was a latrine consisting of urinal and four compartments built over a two foot deep concrete tank. The latter was accessible from outside through a wooden cover. The latrines were emptied, when full, by Koreans until March, 1945, when air raids disrupted the organization. This then became a task for prisoners. The faeces were emptied on the camp gardens and farm. Protests on the above matter were made on sanitary grounds without avail, it apparently being a common practice in Japan. A concession was made, however, with regard to faeces from the dysentery barracks. These were emptied into a pit dug adjacent to the Naval School.

Ablution benches with cold running water were provided.

A hot bath in a wooden tub capable of accommodating six men was allowed twice weekly.

A fire was lit underneath and the water kept continuously hot for all personnel.

Both Japanese and prisoners' food was prepared in the same cookhouse. Facilities were poor, only the standard "Kongs" for rice and soup being available.

All culinary procedures were supervised by the Japanese who forbade anything in the nature of "special cooking." Such orders as those to boil fish rather than grill it were given without any good reason. Invalid cooking was impossible.

All drainage was open. Sullage water flowed from the Camp through open ditches which were deepened as necessary.

Rubbish was burnt or buried, none being taken out of the Camp.

The Camp was completely unsuitable for the housing of sick men. Its aspect was depressing, its sanitation primitive and the living accommodation unsuitable for even healthy human beings by Western standards.

The Japanese, apart from admitting that the place was dirty, seemed incapable of conceiving or supplying anything better.

The whole area was overrun with rats and the buildings infested with bed bugs and fleas.

It took new arrivals weeks to accommodate themselves to the latter, sleep being at first an impossibility. In the summer months mosquitoes were thick. Nets were provided on the scale of two to every four rooms. These each accommodated about six men.

JAPANESE STAFF.—The Japanese staff consisted of a Japanese Medical Officer as Commandant (Captain Tokeda), four N.C.O.s and five other ranks with a civilian interpreter.

PRISONER-OF-WAR STAFF.—The number of personnel varied from six to ten medical officers and twenty to thirty orderlies. At the time of the

Japanese surrender the medical staff consisted of six officers, fourteen orderlies and six cooks. In addition to these, seven Italians were attached to the Camp. They performed general labour work.

General Routine of Camp.

Certain rules for the maintenance of discipline and general conduct of the Camp were laid down by the Japanese. As these were frequently contradicted, however, only a general impression can be given.

DISCIPLINE.—Discipline was according to Japanese Military Law. Most infractions were dealt with summarily by the particular Japanese who decided that a rule had been broken. Common infringements of rules consisted of smoking in the wrong place, failing to salute a Japanese, talking during roll call.

It was required of all ranks, including officers, to salute all Japanese soldiers, N.C.O.s and officers. Punishment usually consisted of being struck one or more times across the face, or being made to stand to attention for a number of hours according to the temper of the particular Japanese who gave the sentence. Severe infractions of discipline, such as stealing food, were punished by imprisonment in the guard room for a few days. This entailed kneeling to attention during the hours of daylight and being allowed what rations the guards thought the prisoner ought to have. In the case of two men who stole bread during an air raid, the offenders were tied naked, with their arms doubled up behind their necks, to the wall and their feet just touching the ground for five days. They were given a bare allowance of water. In all cases of infraction of discipline the punishment was usually entirely out of proportion to the crime and appeared to depend on the state of mind of the Japanese administering it.

During the summer time morning roll call was held at 5.30 a.m. and evening roll call between 7 p.m. and 9 p.m. Working hours were from 7.30 a.m. to 11.30 a.m. and 1 p.m. until 5.30 p.m.

Roll call was attended by all the medical staff and the convalescent patients. It was conducted according to Japanese Military procedure. All personnel were expected to number off in the Japanese language, whilst officers in charge of barracks were required to give commands and report the number and reason for absentees in Japanese. Reports and drill movements were required to be carried out smartly. Lack of compliance resulted in summary punishment.

In the winter, roll call was held at daybreak and dusk. The staff were not allowed to wear overcoats or gloves at this parade even when the temperature was 10° below freezing point, this apparently being the custom in the Japanese Army.

All convalescent patients and *all* medical staff were expected to work. Patients' work consisted in emptying latrines, farming and digging. Two parties daily were sent out to work in the adjacent shipyards. Tasks consisted there in shifting materials, digging air-raid shelters, etc. These shipyards were not actually in production and were apparently in the nature of repair yards for small barges and fishing craft.

Work for the medical staff was of a similar nature except that officers were not asked to empty latrines. They were expected to perform all other tasks, however, such as farming, carpentry, digging shelters, etc.

Hours of work were from 7.30 to 11.30 a.m. and 1 p.m. to 5.30 p.m. but were modified if the staff had medical duties to perform. In actual practice this meant that medical officers were excused manual labour on alternate days from 7.30 a.m. to 9 a.m.

It is considered that the patients were definitely overworked and that great hardship resulted thereby. Rest periods were few and depended on the guard in charge of the working party. Men were dead tired at the end of the day, and in many cases said that the work at the hospital was harder than at their camp.

An official rest was granted on Sunday afternoons.

The medical staff were paid according to their rank. The money, however, had little or no value. A small quantity of cigarettes, about 50 per man, was purchasable at irregular intervals, about once in six weeks. Tea was also purchasable. No pay was given to the patients.

DIET.—The diet at the camp was never good and deteriorated considerably towards the end of the war. A certain basic ration was laid down and would have been almost adequate had the Japanese adhered to it. Petty pilfering, however, and the Japanese custom of taking a percentage, resulted in the prisoners suffering considerably. As an example, if fish came into the camp for 200 prisoners and 20 Japanese, the latter would appropriate 75 per cent of the consignment. Such items as sugar and peanut oil were almost never seen by the prisoners although on the official dietary.

As in other camps an official dietary was laid down for officers, working men and non-working men. These were as follows :—

Grain (Rice, Barley and Beans—usually mixed)—

For Officers—390 grammes daily.

For Working men—705 grammes daily.

For Non-working men (Bed Patients) 570 grammes daily.

The grain ration was supplemented by vegetables at each meal and fish two or three times weekly. Vegetables were made into soup and consisted of potato tops, carrot tops and cabbages ; more rarely actual potatoes, carrots and other root vegetables were allowed.

Meat was a rarity but occasionally bones were issued and cooked with the soup after the marrow fat had been appropriated by the Japanese. In actual practice the officers were granted the full working ration for most of the period of captivity. On occasions, however, the Japanese would remember the regulations and place them on officer's diet for a few days.

The actual quantity of grain was extremely variable. The official mixture was one-third barley or Manchurian corn, one-third rice and one-third beans. Quantities issued daily varied from 600 to the full 705 grammes. The average was about 620 grammes. This diet was a definite improvement on that in Hong Kong where only white rice was given.

The average caloric value of the diet was in the region of 1,800 per day.

Food was prepared under Japanese instructions and supervision. Any method of cooking that might be thought to be in the nature of a luxury, such as grilling the fish, was forbidden. There were no facilities for cooking for invalids. Cases of dysentery were expected to thrive on a mixture of rice, barley and half-cooked soya beans. An attempt to cook the beans separately from the rice and make them more digestible was forbidden by the camp commandant.

On occasions it was possible to prepare soft white rice for the very sick patients but the majority could not be catered for.

During the period May, 1944, to August, 1945, Red Cross parcels on the scale of one per man were received in December, 1944, February, 1945, and March, 1945. A further consignment on the scale of three to five men was received in April, 1945.

In every case except the consignment of March, 1945, the parcels were opened by the Japanese and some of the contents removed. In most cases the loss was two or three packets of cigarettes and two or three tins. It is considered that all of the Japanese staff of the camp were guilty of this larceny. It is also considered that they appropriated complete parcels, on a scale unknown, for themselves.

The patients derived great benefit from these parcels, however, which were received at the coldest time of the year, and a very great debt is owed to the representatives of the International Red Cross in Tokyo for their efforts on behalf of the patients.

That the hospital had an adequate supply of drugs and instruments is due entirely to the work of the Red Cross. Japanese drugs were supplied on a homœopathic scale and, without the very generous supplies sent by the Red Cross, the work of the hospital could not have been carried on with any degree of efficiency. Some attempt at control by the Japanese authorities of the Red Cross drugs was made, and it is suspected that a percentage was diverted from its proper source but, on the whole, the patients received the medicines thought to be suitable for them by the Allied medical officers, it not being difficult to circumvent the restrictions imposed by the Commandant.

Permission had to be obtained from a Japanese N.C.O. to give blood plasma and intravenous infusion, but this was usually granted.

The Japanese Commandant and his Assistant, Lieutenant Fugi, of the Japanese Army Medical Corps, would periodically go through the medicine charts of the patients and recommend or delete certain drugs.

Their decisions were usually arbitrary and seldom had any scientific basis. For these reasons they invariably forgot what they had said on a previous occasion and the Allied medical officers continued to prescribe drugs as they thought fit.

Medical officers were appointed to barracks and had the entire medical care of the patients assigned to them. Case notes were kept on each patient together with a record of treatment received. These records were carefully supervised by the Japanese Commandant who occasionally added remarks in Japanese characters. The Japanese appeared to attach great importance

to these records as did the Allied medical officers who hoped that they would be preserved for examination after the war.

Unfortunately, however, these records were all withdrawn when news of the Japanese capitulation was received and their present fate is unknown.

Patients were admitted to the hospital from all camps in the Tokyo area. Until May, 1945, this area extended from Tokyo to the Northern tip of Honshu (the main island of Japan), patients from northern camps sometimes making a thirty-six or forty-eight-hour train journey.

After May, 1945, however, the area was reduced in size. It was reported that a new hospital was to be established in the North.

Acute surgical and medical cases were admitted only from local camps in Tokyo and Yokohama whilst cases from the North were of a chronic nature.

The Japanese Commandant would make periodic tours of distant camps and send down drafts of sick for treatment.

Cases were sent to the hospital by train, lorry, hand cart or on foot. The mode of transport seemed to bear little relation to the severity of the illness. Pneumonia cases often had to walk part of the way. On one occasion a patient arrived in an ambulance. He was not seriously ill.

Acute surgical cases were often delayed forty-eight hours before admission. In certain cases this was due to the indifference of the Japanese authorities and in others to their incompetence.

No patient could be discharged without examination by the Japanese Commandant. His decisions seemed to have little scientific basis but, with a few exceptions, it was usually possible to dissuade him from sending partly cured men back to their camps.

Surgical Treatment.—Operative facilities were fair. No operation could be done without the permission of the senior Japanese in the camp at the time. This was usually given but in the event of the Japanese Commandant being in camp, this officer would insist on performing, or at least, assisting at the operation himself. The Commandant's knowledge of surgery was abysmal and his technique conspicuous by its absence.

Whenever possible, spinal anaesthesia was used.

Laboratory facilities existed for direct microscopy, blood examinations and urine analysis.

Medicine.—The task of the medical side was easier than the surgical, there being less interference by the Japanese. In March, 1945, however, the Japanese Commandant decided to take over complete control of all tuberculous and serious medical cases. These were isolated in one barrack which was put out of bounds to all prisoners, including the R.C. Padre then living in the camp.

Details of the treatment carried out by the Commandant, Captain Toheda, included the exhibition of such therapy as intravenous soya bean milk; intraspinal vitamin B, vitamin C, and riboflavin; intramuscular injection of sulphur and castor oil; the unskilful performance of artificial pneumothorax on unsuitable patients.

It is considered by all the medical staff that definite harm and misery was caused to sick men by the above and other treatments.

Minor ailments were not admitted to the hospital. The majority of medical cases seen were those of malnutrition, anæmia and pneumonia during the winter. Many of the above cases were found to be suffering from amœbiasis and thus came under the writer's care.

Cases of malnutrition were usually well established and formed a different problem from the fresh cases seen by the writer in Hong Kong.

The commonest manifestations were beri-beri and hypoproteinæmia. Established pellagra and ariboflavinosis were rare. Scurvy was not seen but cases with slow-healing injuries did well under vitamin C therapy.

A high percentage of cases of beri-beri gave a history of chronic diarrhœa. The possibility of latent pellagra was recognized in these cases. Many cases when admitted demonstrated well-marked œdema of ankles, shins and scrotum. Ascites and even the presence of fluid in the pleural spaces was not uncommon. The urinary output was small and albumin not demonstrable. Cardiac tolerance was poor.

These cases did not react so rapidly to treatment as the Hong Kong ones. The œdema would tend to recur when therapy ceased. It was noticed that the presence of diarrhœa bore a relationship to the amount of œdema. Alleviation of diarrhœa in a case of amœbiasis often resulted in the patient becoming œdematous, whilst a sudden attack of diarrhœa in a case of severe beri-beri resulted in apparent cure of the œdema. In all these cases the water metabolism was apparently upset and a certain period of time was necessary for the mechanism to become adjusted.

The following routine was used as a basis of treatment :—

(1) Abdominal paracentesis on alternate days if ascites was marked. The average quantity of fluid removed was about 3,000 c.c.

(2) Daily intramuscular injections (or in less serious cases on alternate days) of vitamin B (thiamine). Dosage 0.25 to 1 c.c. (strength 50 mg. to 1 c.c.). Vitamin B was also given intravenously with 20 c.c. of 20 per cent glucose in cases of severe cardiac failure.

(3) Multiple vitamin therapy was also given by mouth. In practice it was found that the administration of vitamin B by mouth had little effect except in very large dosage. This was thought to be due to poor absorption due to chronic diarrhœa.

(4) Blood plasma ; one unit, or more, was given in severe cases.

(5) Vitamin C was also given by intramuscular injection in severe cases.

Mild cases of œdema of the feet without other signs or symptoms reacted well to 0.25 c.c. of vitamin B (12 mg.) by intramuscular injection on alternate days. The average period per case was two weeks. Cases of chronic œdema appeared to benefit by the administration of calcium chloride intravenously.

The nervous manifestations of malnutrition were variable. In many cases the clinical picture was obscured by a marked functional element, whilst in others it was felt that pellagra, as well as beri-beri, contributed to the clinical picture.

Peripheral Neuritis.—These formed the majority of cases.

Patients complained of a gradually increasing weakness of the legs accompanied by burning and shooting pains described as “electric.” Untreated cases eventually resulted in complete loss of function of the legs.

Tendon-jerks were increased at first and later absent. Plantar response was flexor. Sensory changes were variable. In the early stages deep pressure produced severe pain, particularly over the calves. Sensation later tended to disappear although some cases remained acutely sensitive to light touch, even though the limbs were paralysed. These were a source of amusement to the Japanese doctor.

In general these cases resembled those of toxic peripheral neuritis.

Burning Feet.—Certain cases never came to paralysis of the limbs but complained for months of burning feet. The pain was worse at night and the patients could not bear to keep their legs beneath blankets. They were with difficulty prevented from resting their feet in cold water in the depth of winter. In some cases definite arterial spasm with gangrene was noted. These cases were slow to recover in spite of intensive therapy. Many were complicated by a marked functional element.

PARAPLEGIA AND AFFECTIONS OF SPINAL CORD.—Certain cases were seen in which the spinal cord or the nerve roots themselves were affected. Physical signs were usually those of an upper motor neuron lesion but they were often bizarre. The gait was spastic, the tendon-jerks exaggerated and the plantar response extensor. Muscle wasting was slight. Sensory changes were variable. Position sense and co-ordination were most usually affected.

Many cases bore a superficial resemblance to advanced disseminated sclerosis. They usually did well with intensive vitamin therapy, but in several of them functional neurosis complicated the picture.

PELLAGRA.—Few established cases of pellagra were seen. Occasionally a case of diarrhoea of unknown origin with slow cerebration was seen and found to react well to nicotinic acid. Few typical pellagrous rashes were seen but many patients demonstrated a dry scaly skin. This was thought to be due to lack of fats in the diet rather than to pellagra.

ARIBOFLAVINOSIS.—This was uncommon. A few cases of scrotal eczema with sore tongue and rhagades of the mouth were seen in the summer. They reacted rapidly to riboflavin by mouth.

PNEUMONIA.—Pneumonia was a high cause of mortality in work camps and in the hospital. Cases sent to hospital were seldom seen before the third day. They were treated with sulfa drugs and did well if caught early enough. Nursing facilities were practically non-existent. The Japanese practice of making the patients walk part of the way to hospital and of moving cases on the third and fourth day of illness did not improve the recovery rate.

The high incidence of pneumonia can be attributed to overwork and malnutrition.

Mortality rates of as much as 40 per cent of the camp have been quoted to the writer by medical officers of camps, particularly during the first two years of captivity.

DYSENTERY.—A few cases of bacillary dysentery were treated, but the majority of cases were those of amœbiasis. Many cases of infestation with *Giardia lamblia* and *Trichomonas hominis* were seen.

BACILLARY DYSENTERY was diagnosed by direct microscopy. Cases were few and seldom severe. They reacted well to treatment with sulfaguanidine or sulfadiazine. The average dosage was two grammes on admission, and one gramme four-hourly. The results were better with sulfadiazine than with sulfaguanidine. Patients were usually symptom free in twenty-four hours.

AMÆBIC DYSENTERY was almost endemic amongst prisoners of war in Japan. Few have not complained of diarrhœa, often for long periods at one time or another during captivity. The writer's experience suggests that a high percentage of these have suffered from chronic amœbiasis.

Most cases admitted to the hospital gave a history of intermittent diarrhœa for months. Attacks lasted for a few days when the patients passed about ten foul-smelling stools in the twenty-four hours, many cases reported never having passed a firm stool since arrival in Japan. Abdominal pain was common. A few cases gave a history of passing foul bloody stools with severe tenesmus. It should be noted that many cases were treated in their camps and never reached hospital.

About three hundred American, British and Dutch cases passed through the writer's hands from June, 1944, to August, 1945. Diagnosis was confirmed by microscopy.

SYMPTOMS. *Type I.*—Intermittent diarrhœa of a chronic nature. Blood seldom seen in the stools. Mucus common. Abdominal pain common but mild.

Type II.—Acute onset with fever and bloody diarrhœa. Abdominal pain and tenesmus severe.

PHYSICAL SIGNS.—Acute abdominal tenderness. Spasm of descending colon.

TREATMENT.—Adequate treatment was not possible. Only a small quantity of emetine bismuth iodide was available in 1944, and none in 1945. Approximately six cases were given a full course of this drug. They had not relapsed as far as was known at the time of writing.

Emetine for injection was available from time to time. The quantity of the drug was limited. The results of treatment were disappointing. Almost all cases treated by emetine injections relapsed. This was thought to be due to the following :—

(1) Previous treatment ; when the patient was given a short course of emetine in his camp. This often saved his life at the time and rendered him temporarily symptom free, but in many cases his disease relapsed and was emetine resistant.

(2) Similar difficulties were encountered in the hospital. Limited supplies of the drug only were available. In many cases it was necessary to give emetine when the patient was passing ten-minute bloody stools and rapidly losing strength. Carbasone (*vide infra*) had little effect in these cases.

Unfortunately it was seldom possible to follow up with a full course of emetine and relapses occurred.

LACK OF PROPER DIET.—There was no provision for dieting these cases, and either they ate grain and half-cooked beans or they ate nothing. Soft white rice could be supplied unofficially to not more than two patients without the Japanese finding out. The remainder had to do as best they could. Adequate rest to the bowel was impossible without starving the patient. Most cases placed on emetine received 10 grains over a period of fourteen days. The relapse rate was high.

CARBASONE was available in large quantities. Compared to the writer's peacetime experience with emetine bismuth iodide and emetine the results of treatment were disappointing.

The usual course given was 0.250 gramme b.i.d. (2 capsules) for ten to twelve days.

Mild cases became symptom free in forty-eight hours, but the drug was slow acting in cases of violent diarrhoea with fever and frequent bloody stools.

The relapse rate was in the region of fifty per cent. It was found that cases of recent origin did well and relapsed far less than the chronic cases with a history of several months' diarrhoea.

Almost all the latter cases, even if symptom free, were found to be carrying cysts of *E. histolytica* after the completion of their course of treatment. The majority of cases required at least two and sometimes three courses of carbasone before the stools were clear. A two weeks' interval was given between courses. No cases of arsenic poisoning were seen.

YATREN for oral administration was supplied by the Japanese. 10 cases were given the following course :—

viz.—3 capsules (0.250 t.i.d.) for three days
 6 capsules for three days
 9 capsules for three days
 The relapse rate was 100 per cent

It is difficult to assess the results with scientific accuracy as all notes were taken by the Japanese. It is considered, however, that emetine, to be effective, must be given in adequate dosage.

Carbasone did not seem effective in curing cases of long duration, and was slow to alleviate the symptoms in severe acute attacks. It appeared effective in mild fresh cases.

Emetine bismuth iodide was the drug of choice, and it is regretted that a larger quantity was not available.

Japanese regulations required that a patient show four negative stools before discharge as well as a clear sigmoidoscope examination.

Japanese regulations laid down that stools were to be passed into a Petri dish in the ward and not in the laboratory, so that cold stools had to be examined.

SIGMOIDOSCOPY, part of the test for cure, was carried out by the Japanese Commandant.

The patient was placed on his back with the legs drawn up. The sigmoidoscope, fortunately a small one, was then plunged into the rectum, twisted violently round and then passed as far as the operator could manage under direct vision. A swab would then be taken for microscopy, the remark made that the mucous membrane was hyperæmic and the instrument plucked out. About thirty seconds were allowed to examine the specimen for amœbæ.

For the above reasons it is not considered that the procedure was of any value as a test of cure. The patients were put to a useless, painful and degrading procedure merely to satisfy the sadistic instincts of the Japanese Commandant. Suggestions that the procedure might be carried out by the writer or that another technique might be better were met either with a grunt or a sharp refusal.

COMPLICATIONS OF AMŒBIC DYSENTERY.—Complications were rare. Only two cases of amœbic hepatitis were seen. Both did well with emetine. One case of perforation of the sigmoid colon was seen. This case came to post-mortem when a 4-inch rent was found in the sigmoid colon. The patient had shown no signs of peritonitis and had passed stools up to the time of death.

Two cases of appendicitis were seen and operated upon. In one case the pre-operative diagnosis was that of perforation. The whole bowel was found to be œdematous and very inflamed. The cæcum was acutely congested and ulcerated. The appendix was acutely inflamed. Microscopy after removal demonstrated the presence of *E. histolytica*. Although the patient's red blood count dropped to less than one million, he made a good recovery. Blood transfusions and a course of emetine were given post-operatively.

In the other case a large quantity of pus was evacuated from the right iliac fossa. The appendix was not found. *E. histolytica* were demonstrated in the stools. The patient made a good recovery with emetine bismuth iodide.

A large number of cases of diarrhœa due apparently to infestation with *Giardia lamblia* or *Trichomonas hominis* were seen. They were treated with large doses of atebirin. Usually 0.1 gramme six times daily for three to four days. This treatment usually resulted in cure.

OTHER INFECTIOUS DISEASES were rare. One case of diphtheria was seen in 1944, and seven cases were admitted after the Japanese capitulated. These were American Air Corps personnel who had been kept in solitary confinement since being shot down in May, 1945. Three of them were suffering from a more or less severe degree of paralysis as well as malnutrition. A history of sore throat about six to eight weeks previously was given. None of these cases had had any form of treatment prior to being released from solitary confinement on August 16. One man had also sustained a fracture dislocation of the ankle which had been allowed to become fixed out of position. All seven men were suffering from malnutrition. They were treated with anti-diphtheria toxin, vitamin therapy and blood plasma on admission. They were doing well when last seen on August 29, 1945, when the hospital was evacuated by U.S. Naval forces.

DENTAL TREATMENT.—Dental treatment was carried out with the few

instruments available, many of them made in the camp from odd scraps of metal.

The work carried out was of necessity of a temporary nature. It is of interest to note that a satisfactory dental drill was manufactured by a Norwegian, Mr. H. Pederson, out of an old speedometer cable, some scraps of brass and an electric motor. This civilian, who was captured off a British ship, made many of the instruments and equipment used in the hospital. His ingenuity in constructing such things as bed-pans, sterilizers and other equipment was of great benefit to the hospital.

MENTAL DISEASE.—Only a few cases of mental disease were admitted to the hospital, they included a case of maniacal epilepsy, some cases of simple depression and suspected schizophrenia. There were no cases under mental supervision at the time of release.

The large number of functional neuroses that complicated the diagnosis of beri-beri have been remarked upon. In general, these cases recovered rapidly. The writer is hardly in a position to discuss the question of P.o.W. neurosis but, as far as he can judge, the majority of prisoners released with him seemed mentally quite normal.

Facilities for recreation in the hospital were few. Books were provided by the Red Cross, about ninety during the last few months of captivity, but there was little opportunity for reading. Musical instruments were also available, but as music was discouraged during the daytime and patients were too tired in the evening, little could be done in the way of organized amusement. In spite of this, however, morale was good and, in general, the atmosphere of the hospital was cheerful.

The patients were not unduly disturbed by air raids, in fact these had an excellent effect on morale. An adequate air-raid shelter was built by the staff in February, 1945, and was used on several occasions. No high explosives fell in the camp area but a stick of fire bombs fell in the camp on May 24, 1945. One barrack building caught fire, but no damage or injury to personnel was caused.

CONCLUSION.

An attempt has been made to give a general picture of the hospital with a brief account of the medical work carried out. No specific accusations have been made with regard to ill-treatment.

The writer has tried to indicate in a general way, however, the conditions and abuses from which the patients suffered.

THE ADMINISTRATION OF A MILITARY HOSPITAL.

BY

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[Received October 22, 1946.]

THE administration of a Military Hospital, whether small or large, whether in Peace or War, should be founded on certain basic principles which have not in the past been sufficiently appreciated by all Commanding Officers. Few of the essential principles have been embodied in regulations, and any literature, which has been previously printed on the subject is directed more to safeguards for the Commanding Officer than to the well-being of the technical staff and patients.

No claim is made that any of the ideas presented in this article are original, but, for the benefit of the Commanding Officers of the future, it is felt that there is a case for emphasizing the importance of principles as opposed to fads.

Some conscientious Commanding Officers in the past have achieved success in administering relatively small hospitals of 200 to 400 beds by means of meticulous personal supervision and strict attention to detail. To be successful, this method entails surprise visits at all times of the day and night and savours of the Gestapo. It is a policy founded on mistrust rather than trust, and tends to rob not only staff but patients of their self-respect.

Everyone should be trusted until proved untrustworthy. Without that attitude no hospital can be happy or efficient. Experience has shown that, if the staff can trust the Commanding Officer, he can trust them. To win such trust, it goes without saying that he must be fair in his dealings with all men, and must concern himself with their professional and private comfort. Rarely will he be let down by the idiosyncrasy of some individual who, for reasons of idleness rather than zeal, will offend against the accepted principles.

Because sins of commission or omission in a hospital are liable to endanger the life of a patient it is seldom, and then only after grave consideration, that the offending individual should be given a second chance. Only those should be retained who are assets and trustworthy.

No one will dispute the fact that a patient goes to hospital for examination and treatment by the technical staff. The excellence of that attention is not only of importance to the patient, himself, but also to his employer, the Government. On its success will depend matters that affect the Public purse, e.g. suitable disposal, economy in pensions and man-power hours. It follows from this that, whereas the patient must be the first consideration of the technical staff, the technical staff must be the primary concern of the administrative staff, who must be their servants, using the term "servant" in its true meaning. In other words, the hospital must be organized in such a way that every rule and regulation of the institution tends towards easy working conditions for the technical staff. Every clerk and storekeeper must be made

to realize that the sole justification for his existence is the maintenance of an organization which renders possible easy and efficient medical and nursing treatment, i.e. every medical and nursing officer should be immediately and continuously supplied with his, or her, reasonable demands, so that frustration is unknown by those who carry on the medical work for which purpose alone the hospital exists.

It is common knowledge that no layman patient is capable of assessing the skill employed in his own medical treatment, but that he does understand the meaning of good food and good service. Therefore unless the administration is able to maintain as high a standard in the last two as in the first, it is a failure.

Present-day standards of an efficient hospital demand that the patient is provided with all the amenities of an hotel together with certain other necessities of life which briefly enumerated are : medical treatment, clothing, pay, documentation and entertainment.

It is insufficiently appreciated by those who compose establishments for hospitals what quantity and quality of staff are required to ensure good food and service in addition to those needed to provide the five extra necessities mentioned above. A general duty orderly cannot be transformed into a head-waiter in a day any more than an Army Catering Corps cook or trainee hospital cook can be converted into a chef in a fortnight.

Consideration of these matters leads up, naturally, to the question of War and Peace establishments which should be far more flexible than they are at present. Too often, in the late war, establishments were based on the number of bodies available rather than on the needs of the institution to be staffed. The fact that man-power is deficient is no excuse for sanctioning an inadequate establishment. Any Commanding Officer would rather be told that he can only be completed up to 20 per cent of his authorized strength, than be informed that personnel are not available and therefore he must make do with an establishment which bears no relation to his needs. In the former case, at least, he has the satisfaction of knowing that man-power numbers are a fluctuating quantity and there is a chance that he may be completed up to strength in due course.

In a Service the size of the Army, it can be understood that authorized establishments for hospitals are most conveniently based on the number of beds, but this theoretical standard should not prevent a Commanding Officer from assessing his actual requirements nor blind Higher Authority to the extent of refusing sympathetic consideration to amendments which may be put up. In actual fact the minimum number of all ranks required for the efficient running of any given hospital depends far more on the variety and nature of cases treated ; on the design, distribution and convenience of wards and departments, than it does upon the number of beds. Other factors such as teaching and training responsibilities, leave and absence on courses are liable to be completely overlooked.

Every Commanding Officer on assuming command should weigh up his establishment in relation to his needs and either seek to get an establishment,

where none exists, or cause it to be amended where its existence does not meet the case. In wartime, when any given unit may operate for different roles, in different places and under different conditions at different times, the necessary establishment may be subject to wide variations.

A hospital is a routine affair, like a complex machine, where so many sick are admitted every day and so many fit men turned out. The commissioned and non-commissioned staff, nearly every one of whom has a separate and distinct function to perform, represent the parts. How well that machine operates will depend on the quality of the parts, the fitting of each part into its right place, and the smooth working of each part in relation to adjacent parts. The machine will require suitable housing, fuel and engineers. It is these three requirements which correspond to the administrative side of the hospital.

An engineer is not expected to keep a machine running without thoroughly understanding the exact function and fashion of each individual part and yet how often does a non-medical company officer replace casualties in the lower-grade parts of the machine with the most unsuitable people because he is ignorant of their purpose. Instead of regarding the available personnel at H.Q. company as the potential parts of the machine, there is a tendency for him to consider that the hospital exists for the benefit of the company instead of vice versa. In other words, the machine exists for the part instead of the part for the whole.

The fuel for the machine is represented by the thousands of items of supply, medical, ordnance, barrack, R.E. and stationery required to keep the hospital going. Deficiency in any one of these may impair the efficiency of the whole and slow up production.

The housing of the machine may be compared to the planning of the hospital, which means to say that the allotment of all accommodation in respect of wards, stores, special departments, kitchens, dining-halls, recreation rooms and offices must be made with a view to the maximum convenience of all concerned, with special priority to the people who do the essential work, namely, the medical and nursing staff.

Only certain aspects of hospital life are capable of appreciation by laymen, and these are too often neglected. Amongst laymen are numbered inspecting commanders and staff; visiting regimental officers of all three Services; wives, friends and relations of patients; representatives of foreign powers and, lastly, outpatients and patients for admission. Everyone is possessed of the critical faculty to some degree and consciously or subconsciously forms impressions or even makes a judgment on first contact with an institution. It is most important that first impressions should be good ones and these are bound to be influenced by the following factors.

The hospital site and lay-out must be pleasing to the eye and surrounded by well-kept gardens.

The exterior as well as the interior must be kept scrupulously clean. What good can the Hygiene Department of the Army do by preaching cleanliness to non-medical units, if the medical units themselves cannot set the highest standards in this respect? This is only possible if an adequate number of

trained gardeners and general duty personnel are provided on the establishment for this purpose. The employment value of the fluctuating population of patients for such purposes has been exaggerated. When employed on fatigues outside the hospital buildings, patients tend to complain; no continuity in the work can be assured; and any Commanding Officer who desires a clean hospital is tempted to create a staff of sound semi-permanent "patients" who may be good soldiers lost to their units at an important stage in their training. During the emergency, prisoners of war have filled the gap very creditably.

Hospitals everywhere are almost universally under sign-posted. This is a source of great irritation to the casual visitor and outpatient. People working day in and day out in an institution tend to take their whereabouts for granted. No allowance is made for the newly joined member of the staff trying to find one ward or department from another, nor is any account taken of the waste of time and professional efficiency which results. To sign-post a hospital properly, it is essential to imagine oneself as the newcomer in all the various categories and with all the different needs of staff, patients and visitors. In a large hospital one or two painted plans of the layout, erected on posts in the grounds, are of great assistance.

Good reception to patients and visitors is of the greatest value because their whole outlook in regard to future dealings with that hospital is tinged with bright or gloomy colours as the result of first impressions. A patient, who, on first admission, can say to himself "This is a good hospital" will accept without murmur anything that may be coming to him afterwards. In this connexion, first-class accommodation and administrative arrangements for convoy reception in War hospitals cannot be over-stressed. With good organization two admissions per minute, with all clerical particulars obtained, in a convoy of 300 sick, has been achieved.

It will be noted that a great deal of stress has been put on facilities for reception, but this, unless coupled with welcome and politeness from the receiving staff, will fail to impress to the maximum extent. The importance of good manners in the staff of the enquiry office must also be emphasized. People working short-handed and under difficulties are inclined to be short-tempered, so once more the question of an adequate establishment arises.

In an earlier paragraph, a hospital has been compared to a machine in which the running is routine, and from which good output requires well-assembled parts of good material, well lubricated and supervised. The main difference is that in the hospital the machine parts are composed of human beings, inclined to idiosyncrasies which interfere with smooth running. So long as the machine is running sweetly, it should be no more necessary for the Commanding Officer to interfere at unexpected hours than it is for a chief engineer. Like the latter, the Commanding Officer should take daily reports from his assistant engineers (the Matron, the Officers-in-charge of divisions, the Registrar, the Quartermaster, and the Company Officer), and carry out his daily routine inspections of a portion of the machine at a certain specified time and for a given period.

Nothing upsets routine so much as unpunctuality and therefore all routine

inspections should, and nearly always can, be timed to the minute. Commanding Officers should demand exact punctuality from their subordinates and are not in a position to do this unless they are punctilious in the matter themselves. Punctuality saves overlap of interviews and avoids needless hanging about, with loss of time which represents output, and general annoyance to the staff and patients throughout the hospital.

Nowhere is one better rewarded for putting "First things first" than in a hospital, and for that reason the following order of daily interviews is recommended with timings for each.

- | | |
|--|------------|
| (1) Registrar to report any major event .. | 08.45 hrs. |
| (2) Matron | 09.00 hrs. |
| (3) Officers-in-charge of divisions .. | 09.10 hrs. |
| (4) Quartermaster | 09.30 hrs. |
| (5) Company Officer | 09.45 hrs. |
| (6) Registrar with correspondence .. | 10.00 hrs. |

The advantage of the above sequence is that, apart from important events notified under (1), it enables technical requirements notified under (2) and (3) to be arranged for in interviews (4), (5) and (6) (the maintenance services). It avoids waste of professional time under (2) and (3) on account of disciplinary and kindred matters which only concern (5) and (6).

The Commanding Officer's daily routine inspection is most conveniently timed for all concerned at 11.00 hrs. It should be faithfully and intelligently carried out week by week so that all wards and departments are covered in every six working days and every patient seen with information as to diagnosis, treatment and disposal. Where emergency commissioned officers are employed, the last-named is exceptionally important. The need for maintaining up-to-date and accurate records can never be stressed too often on these rounds. Apart from general ward discipline and cleanliness, latrines, bathrooms, clothing, bedding, ward kitchens and medicine cupboards must be zealously supervised, for they are the outward and visible signs of a good hospital. It is most important that inspections should be snappy and to the point. They cannot be usefully prolonged beyond one and a half hours, nor can more than 150 sick patients be covered in one inspection. The Commanding Officer who runs past each bed without enquiring about the occupant is wasting his own and everyone else's time. In very large hospitals it is better to break the rule of seeing every patient in every week and keep to a maximum of 150 patients per morning.

A useful axiom to observe at all inspections of wards and departments is that every article of equipment which is not in use, or likely to be used, should be returned to its appropriate store for further disposal. Further hall-marks of a good hospital are electric light switches turned off in daylight, no dripping taps, basin and bath plugs in situ, paper in the latrines, and no dirt behind movable objects.

It is believed that command pay was originally given to Commanding Officers to indemnify them against responsibility for loss of stores. Under the new pay code this form of insurance has ceased to be. In theory it was a

bad principle, because it countenanced loss by neglect. In practice, it gave a sense of security to the more timorous and fearful type of Commanding Officer and, in efficient establishments, where it was not drawn upon to pay for deficiencies, it was a reward to the Commanding Officer for accepting financial responsibility to a degree which is not required in the higher appointments of the Medical Services.

In repeating that the running of a hospital is a routine affair, one is in fact stating that a really fool-proof and complete set of Standing Orders, including the duties of every grade and trade and their particular responsibilities in regard to Government stores and equipment, should be all that is necessary. Only by this means can blame be attached to the right people if and when anything goes wrong. The number of daily orders issued will then be reduced to a minimum and seldom amount to more than a direction to any particular paragraph in Standing Orders which has been infringed.

Of all standing orders, none are more important than good Fire Orders, for in the event of a Court of Enquiry on an outbreak of fire, a copy of these orders will be almost the first request by the President of the Court.

It is justifiable to assert that the Commanding Officer, who has taken real trouble and all possible steps to "tie" things up properly, need fear no man in respect of financial losses and can rest assured that he will never be ordered to pay from his own pocket.

The Commanding Officer who lives in constant fear of being found out is a menace to all men. He institutes repeated checks out of all proportion to the value of the stuff involved, and repeatedly offends by upsetting the work of the technical side. Embodied in his standing orders, provision should be made for a proper hand-over and take-over by all individuals, however lowly, who are responsible for Government equipment. Immediate report and early adjustment of losses and breakages will save a great deal of checking and interference with the technical staff.

Never before in the history of military hospitals has so much interest been taken by the general public in the "welfare" of patients than during the 1939-45 War. Never before has a subject been attacked with so much lack of proportion and so little imagination that the very meaning of the word has been prostituted. Never before has the medical profession had to submit to so much interference and to so many insults from well-meaning non-medical "nosy parkers" as they have under the name of "Welfare."

Owing to enemy bombing in the United Kingdom, the lay public had more to occupy their attention than in semi-belligerent countries such as India, where welfare was given so much No. 1 priority in hospitals that without a strong Commanding Officer, the original functions of those institutions were inclined to become obscured.

The writer is the first to acknowledge that welfare is of the utmost importance in hospitals, provided that the word is used in its proper meaning, and the various aspects of it are kept in their proper places. For that reason it is necessary to consider the subject in some detail.

Welfare must be considered under two headings, viz. welfare for the staff

and welfare for the patients. The staff are considered first, because they are too often overlooked through lack of appreciation of the fact that an unhappy staff makes an unhappy hospital. When that is the case, the irritation of the staff will reflect on the patients and no "welfare" measures on behalf of the latter will compensate.

Welfare for the staff entails good housing conditions, whether in messes, billets, or private lodgings; recreation rooms with provision of amenities such as wireless sets, billiards table, piano, and indoor games, which should be quite as good as those provided for the patients. Dining halls, barrack rooms and kitchens must be maintained to a high standard and the quality of the food and service must be excellent. A nursing orderly living under miserable conditions cannot be expected to keep up a high degree of cleanliness in the wards, nor can medical or nursing officers maintain an atmosphere of cheerfulness in their departments if martyrs to indigestion through bad cooking in their own messes. Establishments for medical and nursing messes seldom, if ever, provide for good cooks and where they do exist the credit is due largely to the interest of the Commanding Officer and Matron.

Facilities for outdoor sports are usually provided and need to be watched to ensure that prowess in sport is not used, in individual cases, as an excuse for evading a fair share of the work. The convenience of technical staff and patients must not be sacrificed to the reputation of the Company football team.

Welfare of the staff may be subdivided into private and professional welfare. The former has been dealt with in the foregoing paragraphs, but the latter is often of more importance, particularly in respect of the medical officers. Doctors, everywhere, who are worthy of the name, are prone to consider their brains before their stomachs. For this reason, administrative service to the technical staff has been strongly emphasized. Nothing produces frustration in highly technical officers so much as interference with or lack of facilities for the best scientific work. Frustration breeds a state of chronic irritation, which is communicated to the patient, and, in the end, it is the patient who suffers most. It should be the Commanding Officer's object to forestall and, if necessary, eliminate all irritation within the hospital, just as much as it is his business to act as a buffer against all irritation directed towards the hospital from without.

As regards the welfare of the patient, let it be stated here and now, that no form of "Welfare" is as important or comparable to good professional treatment, even though the patient at the time may be incapable of appreciating it. Pink silk cushions in a recreation room do not compensate the patient for a badly treated fracture which renders him a cripple for life, any more than a nicely tinted ward colour scheme will make up for the missed early case of phthisis. Technical efficiency must come first. Administrative service, which contributes to that end, must come second. Four of the most important items of service are food, attendance, pay and mails, for they, above all others, conduce to morale. All resources left over after those primary needs have been met, can and should be devoted to making the patient's life and living conditions

as attractive as possible. This includes visiting entertainers and concert parties who should never be allowed inside a hospital until the routine medical work of the day is finished. Before now, a Commanding Officer has incurred the greatest official odium for refusing to allow well-known professional "comics" to perform in the unit theatre to an audience of 400 patients at 11.00 hours in the morning and to visit bed-patients, afterwards, at the hour of distribution of the midday meal. Little imagination is required to conjure up the picture of consternation and confusion amongst the medical and nursing staff resulting from the gratification of such a "welfare" visit.

The mental outlook and occupation of the patient have received insufficient attention in the past and to that end well-furnished, prettily decorated wards and recreation rooms are necessary and must be encouraged. The whole subject of non-technical welfare in a hospital is best co-ordinated by a standing committee consisting of Commanding Officer, Matron, Registrar, Quartermaster, principal Red Cross and W.V.S. workers, who should meet at least once a month.

Education for patients, continually pressed from outside, is theoretical rather than practical on account of the rapid turnover in population which, in a large hospital of 2,000 beds, may attain the figure of 500 per week. The old Latin tag *mens sana in corpore sano* is as true to-day as it ever was and therefore educational classes more properly belong to the convalescent depot or to the patient's unit. Lectures of general interest, e.g. music, art, and literature, by professional lecturers from outside, will usually attract a small but select voluntary audience and should be encouraged.

It will probably be admitted that officers, speaking generally, are the most difficult patients and so often those who are junior and have known the least are those who make the most fuss and demand the best, particularly in regard to food and service. A really good chef, who exhibits a personal interest in the food fancies of individual sick patients and a trained head waiter in the officer patients' dining room will do much to eliminate any complaints about feeding, whilst selected nursing sisters with personality and charm of manner will keep the officer patient population contented in other respects. They are also worth their weight in gold in dealing with difficult friends and relations.

The above points are only minor but important instances of putting round pegs into round holes, which is one of the chief responsibilities of the Commanding Officer and should be applied right down to the latest joined recruit. Personal conversation with the staff in the course of the daily rounds will often bring to light some unsuspected trade, hobby or other qualification which specially fits a man for some particular job until such time as the demands of the Service, working through the R.A.M.C. Record Office, translate him, all too soon, to another sphere of activity.

Finally, a Commanding Officer can only be certain that the machine is working properly by seeing the output before discharge from hospital and satisfying himself that there are no complaints. In hospitals of under 600 beds, it should be possible for each patient, on discharge, to be interviewed separately by him in the office and asked whether he is quite well and whether he has

any complaints to make. Patients are more likely to prefer their complaints in private than in public and any complaint received should be investigated immediately. The Commanding Officer can satisfy himself as to the standard of case-taking and record-keeping at the same time. In larger hospitals it will be necessary to delegate these duties to officers-in-charge of divisions, who should report any genuine complaint or irregularity to the Commanding Officer.

Every complaint or irregularity in wards or departments should be settled at the lowest levels possible and only go higher where immediate satisfaction is not achieved by all concerned. Something is wrong if the Commanding Officer does not first hear of the complaint of a nursing officer from the Matron, of a ward orderly from the Company Officer, and of a patient from the Registrar or Divisional Officer.

Nothing contributes more to ill-discipline, low morale and unhappiness than failure to deal adequately with, and to eliminate, complaints. The Commanding Officer who has no eyes to see and no ears to hear lives in a fool's paradise. Ministerial enquiries will snow him under and be his bugbear instead of a rare pleasure for him to answer.

A summary of principles in hospital administration is now appended ; they are classified in accordance with their particular relationship to A, The Hospital ; B, The Commanding Officer ; and C, the Welfare of Staff and Patients.

A.—The function of a hospital is the treatment of the patient.

Complete and fool-proof Standing Orders, including Fire Orders, are the basis of Administration.

The Administrative staff must be the SERVANTS of the Technical staff.

The technical staff must be provided with all essential needs.

Food and Service must be of a standard worthy of the technical treatment.

An adequate establishment to meet the needs of each particular hospital must be provided, whether personnel are available to complete to full strength or not.

Staff who are passengers and a danger to patients, should be employed outside hospitals.

B.—Trust in Staff.

Punctuality in all things.

Priority to be given to Technical, Food, Service, and Welfare in that order, in all matters.

Routine daily interviews in order of above priority.

Routine daily inspections in order of above priority.

A thorough hand-over and take-over by all individuals responsible for Government stores, and punctual rendition of loss and breakage reports must be insisted upon.

Immediate investigation of any complaints by patients or staff must be made, whether at the discharge parade or in the course of routine work.

C.—*General*.—A pleasing and well-tended hospital site.

A clean and well-decorated interior.

First-class sign-posting.

Excellent reception arrangements.

Staff.—Good housing, feeding and recreation.

The elimination of frustration, interference and obstruction by the administrative staff.

Patients.—Good professional treatment.

Good food and service (especially Pay and Postal facilities).

Unit Welfare Committee.

Elimination of the Institutional atmosphere.

The provision of comfortable and decorative living conditions and good recreational facilities.

Entertainment provided from outside sources.

The principles, as enumerated, proved their value in the administration of a General Hospital for British Troops over a period of over two years. The hospital comprised 2,300 beds (including 90 beds for women and children) and served almost every general and special branch of medical science. It was also the teaching hospital for grading R.A.M.C. specialists and instructing I.A.M.C. probationary lieutenants.

During the period mentioned, every British officer and soldier, invalided ex India, Iraq and Burma passed through its portals for a Review Medical Board.

It withstood the fire of criticism and won the approval of the Highest in the Land, of the 50,000 patients who passed through and of the large medical and nursing staff who worked there.

The same principles were later inculcated as far as possible into what became the "show" hospital centre for India, of 10,000 hospital beds, and met with the approval of the most co-operative lot of Commanding Officers, with whom it could ever be one's pleasure to serve.

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THE AFTERMATH OF WAR IN MEDICINE.
An address delivered to the Royal Medical Society of Edinburgh,

BY

Major-General PHILIP H. MITCHINER, C.B., C.B.E., T.D.

[Received November 6, 1946.]

THIS is an attempt to carry out the difficult task of evaluating what medical science has achieved during the late war, an effort in fact to prepare a balance sheet between what has been gained and what has been lost. One has had the opportunity during the war of an enormous field of research and the facilities for following up the results of all our work in a manner which is quite impossible in peace conditions, and in this way the late war, like that of 1914-18, has proved a most valuable source of knowledge to the profession. One of the most outstanding features of Service medicine has been the development of a team spirit amongst all members of the profession, which has enabled the patients to achieve the full benefit of consultation between members of all branches of the profession, and the profession to benefit by contact with colleagues of various interests. This, to my mind, has been one of the most valuable assets arising from the war, both to patients and profession, and is one which augurs well for the future success of a State Medical Service.

PREVENTIVE MEDICINE AND HYGIENE.

The aim of the existence of the medical profession is primarily to benefit the human race and in this respect preventive medicine is far more valuable to our patients than the attempts to patch up and alleviate their established diseases, though such is the established civil practice ; in the Services, on the other hand, prophylaxis has long held pride of place wherein Service medicine has been greatly in advance of civilian. In preventive medicine the war has undoubtedly provided an enormous advance. We have only got to consider the success of inoculations and the enormous diminution of epidemic diseases following their general use to realize the progress made in this field. It is not for me, a surgeon, to delve into the realms of medicine but my recollection takes me back to wars where the death-rate and decimation of the forces from epidemic diseases such as typhoid and diphtheria has far exceeded the casualties inflicted in battle and it is because of the efficiency of preventive inoculations that such a state of affairs has now ceased to worry our fighting forces. It is true that improved hygiene has undoubtedly played a leading part in the prevention of all these diseases, which carefully considered hygiene and the prompt disposal of human excrement do so much to prevent. The advance of flying and free movement of peoples in all parts of the globe must unfortunately tend to increase the danger of epidemics and yet no such increase has occurred ; a great tribute to the efficiency of preventative inoculations in typhoid, diphtheria, yellow fever, plague, typhus and similar conditions.

MEDICINE.

In medicine itself we have seen, to my mind, a revolutionary advance in the substitution of mepacrin and paludin for quinine in the treatment of malaria.

These drugs, so far as my experience as a surgeon allows me to judge, have proved of good value in the treatment and prevention of the acute forms of malaria but, like quinine, they seem singularly ineffective in the control of the benign tertian infection.

The introduction of sulphonamides and penicillin has had revolutionary effects in the treatment of such previously fatal diseases as meningitis and pneumonia; while, in the venereal diseases, gonorrhœa and syphilis particularly, the general use of chemotherapy has dramatically altered our outlook on their treatment though we yet await proof of permanent cure. Sulphaguanidine and its allies have removed much of the terror of bacillary dysentery.

Diet in the treatment of disease, as well as in the preservation of health, has been widely recognized as of great importance, and great credit is due to the administrative authorities, both lay and medical, in the various Services for the great improvements in cooking and dietary which have been carried out.

Graduated exercises in stabilizing fatigue-tolerance and preventing exhaustion have been well recognized in the preservation of general health and increased endurance, as well as in the prevention and treatment of such conditions as exertion angina.

Exertion angina is another field of medicine which has come very much to the fore during the late war and it has certainly been established that psychic disturbances are closely associated with this distressing condition. Though, it is necessary to note, from the surgical point of view, that in a small proportion of cases detailed examination has shown lesions such as dermoid cysts or substernal goitres to exist unsuspected in the mediastinum.

The discovery of D.D.T. has alleviated the discomforts and diseases due to body vermin and further developments must be watched with interest not untinged with anxiety as to the use of this insecticide in nature. D.D.T. has undoubtedly a great future but it is to be used with caution in the fields of parasitology and agriculture especially, for it destroys the useful with the dangerous and may well lead to disastrous and dangerous effects if used indiscriminately. It must be remembered that dermatitis is liable to follow the intensive use not only of D.D.T. but also the chemotherapeutic agents, especially the sulphonamides, and that whereas these agents are frequently primarily used for the cure of septic dermatitis, the condition may be aggravated and maintained by their over-zealous application.

Psychiatry has become firmly established and is undoubtedly of very great use if applied judiciously and properly in many fields; particularly in the selection of personnel for suitable employment in industry it has its greatest and most useful feature and it is surely not without its advantages in the selection of students for the particular university career which they can most profitably follow.

SURGERY.

Transfusion.—Turning now to the realms of surgery, I think probably one of the most outstanding advances has been in the universal use of transfusion in the prevention and treatment of shock, and especially wound shock, with

consequent improvement in results of surgery in trauma. At the same time, a word of caution is necessary against the indiscriminate use of blood transfusion. One has seen a number of patients who have survived in spite of excessive transfusion. One has also seen and heard of still more patients who have not! It must be remembered that only in cases where fluid has been lost from the body is it justifiable to give excessive amounts in transfusion and here, in my experience, it is better to limit the amount of fluid introduced to that lost plus one or, at the most, two pints in excess, and where shock occurs without loss of fluid, not more than one or two pints of intravenous fluid should be administered. Furthermore it is essential to give this fluid slowly, except where great fluid loss is occurring and as a general rule a rate of 40 drips per minute is sufficient to ensure success. Moreover in certain conditions such as severe burns, where the loss is mainly serum, and severe crushing; where there tends to be a toxic degeneration of the liver and kidneys, it is far safer to give plasma or serum than whole blood which is frequently fatal in its results in such cases.

Wounds.—In order to meet the needs of mobile war and ensure dealing with the wound in the first six hours after its infliction as is necessary if the inevitable infection of all such injuries is to be eliminated and the prolonged sufferings and delayed healing averted, it was found necessary to move surgical facilities forward. This was achieved by the formation of mobile surgical units in which bedded wards with nursing sisters were included so as to retain patients for at least ten days after operation, a procedure which was found to be of the greatest value in ensuring their recovery after the earlier surgical procedures. It was further found that unless this retention of patients after operation could be ensured, it was, in the vast majority of cases, affording them a better chance of recovery if they were moved back before operation, even to the delay in this procedure and, for this reason, the surgical centres were usually attached to a casualty clearing station where beds were available for the retention of patients for several days after operation.

Though the war has finished, the appalling rate of road accidents makes the field of traumatic surgery a very fruitful source of practice and with the wounds runs the contemporaneous question of infections which invariably follow road and battle casualties. Chemotherapy has made enormous steps during the past six years and the introduction of the sulphonamides and subsequently penicillin has really revolutionized the treatment of infections but it cannot be stressed too strongly that these drugs are but adjuncts to supplement adequate and early surgery in removing all dead and damaged tissue from wounds, in evacuating pus, and removing dead tissue where gangrene has occurred either in septic osteitis from infection with gas organisms from damage to main blood-vessels. There is a tendency amongst the profession and public to-day to regard penicillin and the sulphonamides as panacea. This is far from the case and undoubtedly many lives have been lost by using these drugs either in the presence of non-sensitive bacteria or where a localized abscess continues to spread locally in a vital organ in spite

of the chemotherapy and in the absence of the necessary surgical intervention. With penicillin administered systemically and locally, primary suture, where no tension exists and where no extensive muscle crushing and disruption are present, has become a safe and almost routine practice, thereby saving great suffering to the patient and ensuring a fairly short convalescence. In many other cases secondary suture can be performed in a few days, and many surgeons advocate this as a safer routine.

We have learnt that in severe crushing of the limbs the prompt application of a tourniquet and the amputation of the grossly damaged tissue before that tourniquet is removed is frequently a life-saving operation, as we have learnt that severe crushing, if not promptly isolated from the circulation, can cause acute toxic damage to the liver and kidney and often prove fatal.

Burns have been distressingly prevalent, both as a result of the type of warfare and the free and often injudicious use of petrol. Much doubt and many practices now exist in their treatment which proves that no satisfactory treatment has yet been arrived at and that there is much work to be done on this subject. As with wounds the importance of early and thorough surgical cleansing to eliminate infection is paramount. I would remind you that in all cases of severe burns the excessive loss involves serum only, with consequent hæmoconcentration and that the replacement of this fluid must be by intravenous therapy with serum or plasma but *never* whole blood which frequently produces fatal congestion of the kidney and liver with excessive red cells. It must further be pointed out that there is a tendency on the part of the plastic surgeons to advocate treatment which will produce perfect results with little scarring, and lose sight of the essential of saving life in the earlier stages of severe and extensive burns where, unless the escape of serum can be prevented and replaced, a fatal issue will occur long before the case can come under the care of a plastic surgeon.

In the *abdomen* probably the greatest advance has been the exteriorization in all wounds involving the large bowel and rectum. As with all new practices, there is possibly a tendency to carry exteriorization to excess and my own experience leads me to support that school which advocates that wounds of the cæcum and ascending colon can be treated safely by primary suture *in situ*, as in the case of wounds in the small bowel, without exteriorization.

One has been greatly struck by the young age at which one has met with carcinoma, both of the stomach and of the rectum, it being no uncommon thing to see cases in men from 20 to 25 years of age. In this regard I would issue a word of warning, that the granuloma of amœbic dysentery has on more than one occasion been misdiagnosed and treated as carcinoma, a mistake which should never occur if careful examination of the *fæces* is made as a routine in all cases.

Orthopaedic surgery has become such a specialized subject that its practitioners embrace all surgery and have indeed almost reverted to the general surgeons from which they sprang. In the *treatment of fractures* in war conditions one must realize that the force of an explosive missile and even the exhausted condition of the muscles of the patient when wounded

produce a complete muscular relaxation and absence of pain which is never met with in conditions of civilian practice. This makes the manipulation and setting of fractures in war conditions far easier than we see in civil life. But inasmuch as nearly all these fractures are of an open type, sepsis and delayed union, often with sequestration, are not uncommon, though the use of penicillin has greatly reduced, if not eliminated, these complications. One of the striking things is the delay in union or shall one say the longer period necessary for union which has been noted throughout this war. It is customary to attribute this to the great disruption of the tissues due to the high explosives used in modern warfare but I cannot help feeling that it is partly due to the orthopaedic surgeon and his meticulous desire to over-manipulate the fractured tissues in order to obtain perfect and complete anatomical reposition of the damaged bone fragments.

Internal derangement of the knees has been seen in large numbers and it is increasingly obvious that operative interference even in the presence of a definite lesion of a miniscus is by no means curative and may, in a certain number of cases, cause deterioration in the joint, even when the operation is performed by the most skilful hands.

It is interesting to note that there has been a definite turn back to advocating *primary suture of nerves* even in the presence of sepsis. I have always advocated this practice and I feel that it is the right one for the results obtained are far better for the patient even in those cases where delayed secondary suture is ultimately carried out.

Flat feet, like the poor, are always with us and particularly common among the infantry soldiers but are not a condition which call for treatment unless giving rise to pain and disability.

March fractures involving the neck of the second metatarsal base of the fifth and upper end of the tibia are common in young recruits and in my opinion due largely to ill-fitting and heavy footwear and too sudden transition to strenuous training from a previously sedentary life.

REHABILITATION.

Rehabilitation is a subject which the fundamental necessity, with limited man-power, of returning every man and woman to duty in the shortest possible period has brought very much to the fore. This is, after all, only old wine in new bottles but it makes rather a reflection on the medical profession that it has been necessary to bring it so much to the fore and this leads me to mention the vital necessity of keeping in view the human element in our patients. They must be regarded as human beings suffering from a disease and not as so many cases of a certain disease, for we each of us, thank God, differ from our neighbour and we need slightly different humouring and this is a matter all too frequently lost sight of in these days, in spite of the popularity of psychiatry.

Lastly, in medical education the decentralization of the hospitals and disruption of the medical schools which was particularly notable in London, together with the departure of many of the teachers into the Services, lead,

as in all wars, to an inevitable throw back of the education of the rising generation of doctors, while the somewhat imperfectly aseptic and difficult conditions in which surgery has to be carried out lead to a falling off in the standard of asepsis and operative efficiency which reflects for many years on the surgery of the country.

I have endeavoured, and I hope succeeded, in showing you the gains and losses to the civil profession from the results of medicine in war conditions. I hope that I have reassured you and more particularly can reassure the lay public that the results of a national medical service in war have been such that the advent of a State service properly worked, with a spirit of professional independence on the part of the medical practitioner, can offer the public a service even better than it receives from the general practitioners and hospitals to-day, as instanced by the results achieved within the Medical Services of the fighting forces and in the E.M.S.

Finally, I hope I have convinced you that those members of the profession who have worked in the combatant Services have had every opportunity of seeing medicine in a variety of aspects and in many countries ; and so they are not out of touch with either the preventive or clinical problems of their art as is so frequently thought by some of our colleagues who have stuck to their lasts at home.



Editorial.

THE ROYAL ARMY MEDICAL CORPS MEMORIAL FUND.

AN appeal for the Memorial Fund is now being launched under the auspices of the Royal Army Medical Corps Association.

Her Majesty the Queen, our Patron and Colonel-in-Chief has sent her good wishes for the success of this Fund in a most gracious message which will be published with the formal appeal.

After a series of meetings in Commands, selected representatives from each Command met in London at a central representative meeting, under the chairmanship of Lieutenant-General Sir Alexander Hood. There were representatives of all ranks—Regulars, Territorials and War Engagements.

After a lengthy discussion the following Charter met with general approval and was adopted.

The Memorial to the dead of The Royal Army Medical Corps in the war of 1939-45 will consist of a Fund to be known as "*The Royal Army Medical Corps Memorial Fund*." This will be devoted, *first*, to the welfare of families of all ranks of the Royal Army Medical Corps who died in the war of 1939-45 ; also of all ranks of the Corps who served in that war and of their families who may be in need through sickness or other misfortune ; *secondly*, to the provision of a permanent Memorial part of which shall incorporate the names of those who died. The amount to be spent on this permanent Memorial will be kept to the minimum sum necessary to raise a memorial in keeping with the high traditions of the Corps, having regard to the fact that all ranks believe that to succour the living is the best way to honour the dead.

Sir Alexander Hood has written the following letter to the Secretary of the Royal Army Medical Corps Association.

"I am delighted to hear that the Association is to take the lead in launching the Memorial Fund.

"I suppose the appeal is likely to reach our members about Christmastime, and surely there could be no better Christmas gift than a donation to this Fund which brings help to those who are in need and, at the same time, honours those who have added so many glorious pages to our splendid tradition.

"It would, indeed, be a magnificent inspiration if anybody who is serving, or has served, in the Corps—from the General to the latest recruit joining

the Depot ; from our famous consultants (to whom the Corps owes so much) to the newly released private soldier taking his first faltering steps in civilian life (whose services were equally essential)—would give one day's pay, or earnings, to this grand cause.

“ May I commend this suggestion to all our members and ask them to bring it to the notice of any others who may not belong to the Association.

“ All good wishes for success in your appeal.”

Subscriptions may be forwarded direct to : The Honorary Treasurer, Royal Army Medical Corps Memorial Fund, Messrs. Glyn Mills & Co., Kirkland House, Whitehall, S.W.1.

Reviews.

PRACTICAL POINTS IN PENICILLIN TREATMENT. By G. E. Beaumont and Palmer.
J. & A. Churchill Ltd. Price 1s. 6d.

The object of this pamphlet is to prove of value to doctors who have not had the opportunity of studying the administration of penicillin in hospital. It achieves this object admirably. Although the pamphlet only comprises fifteen small pages it contains a surprising amount of information; it even finds space to describe with diagrams the sites of injection best calculated to avoid the sciatic nerve catastrophe.

One statement, however, cannot be passed without comment. In the last paragraph we read that, among many other conditions in which penicillin is of no use, dysentery is included. It has been shown recently (probably after this booklet was written) that in "Emetine Resistant" cases of amœbic dysentery, which are the type of case that doctors in this country are likely to be faced with during the next few years, a preliminary course of penicillin is invaluable in abolishing secondary infection and rendering the amœbæ accessible to the subsequent course of emetine.

A minor criticism is the prescription of doses in millilitres instead of cubic centimetres.

One of the authors has stated the case for the millilitre in recent correspondence in the *Lancet* but, as long as the syringes used in hospitals are calibrated in cubic centimetres, the use of millilitres in prescriptions may lead to confusion.

The booklet is a most useful practical guide and should be of great value to all practitioners of Medicine.

J. C. G.

ILLUSTRATIONS OF ANATOMY FOR NURSES. Second Edition. By E. B. Jamieson,
M.D. Edinburgh: E. & S. Livingstone. Price 8s. 6d. net.

In 1938, Mr. Jamieson selected 62 plates from his "Illustrations of Regional Anatomy," and these were issued in one volume for the use of nurses. In this Second Edition the number of illustrations has been raised to 64, and the quality remains that of the well-known parent volume. This book is recommended.

D. C. B.

CHEMOTHERAPY, YESTERDAY, TO-DAY, AND TO-MORROW. By Sir Alexander Fleming, F.R.S. Cambridge University Press. Pp. 39. Price 2s. net.

In this, the Linacre Lecture delivered at Cambridge on May 6, 1946, Sir Alexander Fleming gives a popular account of the history of chemotherapy of bacterial infections, from the early days of antiseptics to the latest advances in antibiotics. The author refers modestly to some of his own lesser-known contributions to the subject and closes with a strong appeal for the foundation of an Institute for research in microbiology.

P. S.

SYNOPSIS OF OBSTETRICS AND GYNÆCOLOGY. Ninth Edition. By Aleck W. Bourne, M.A., M.B., B.Ch.Camb., F.R.C.S.Eng., F.R.C.O.G. Bristol: John Wright & Sons, Ltd. 1945. Pp. vii + 500. Price 21s. net.

This companion volume to the other well-known "Synopsis" fills the same position in its own subject.

Its layout and presentation are clear and it is well indexed. The illustrations are of necessity few and small, but to the point. It is of convenient size.

Like the other synopses it is not a short cut to knowledge—the necessarily concise presentation demands previous reading and understanding of the subjects—otherwise pitfalls await (for example in the symptomatology of Catarrhal Salpingitis "Rigidity" and in Suppurative Salpingitis "Seldom complete Rigidity").

In its appointed function as a revision book it eliminates much of what, to the examination-conscious, is "dead wood" and should prove very useful.

For the qualified man it should have its uses as a pointer to new reading necessitated by wartime rustiness, as well as refreshing the memory on the basic principles.

AVIATION NEURO-PSYCHIATRY. By R. N. Ironside, M.B., F.R.C.P., and I. R. C. Batchelor, M.B. Edinburgh: E. & S. Livingstone, Ltd. 1945. Pp. 167. Price 8s. 6d.

The authors of this interesting handbook insist, as all Service doctors learn to do, on a knowledge of the environment of their patients, as well as of the tasks they are required to perform.

The book starts with a few words on anoxia, C.O. poisoning, bends, cold, the effect of acceleration, flying discomforts, and that interesting condition known as accident proneness. There follows a well-written chapter on a planned neuro-psychiatric examination which is recommended to any Service doctor. In place of flying read, in the Army, for example, Artillery or R.A. Corps work, in the Navy, the personnel problems on a destroyer or motor gun-boat—the difficulties are closely similar. The rest of the book is devoted to "neuro-psychiatric disorders" in aviation. Perhaps a word may be said on this rather mysterious hybrid expression. For if the truth must be told the whole book tends to show that the problems of these aviators are nearly 100 per cent psychiatric in their ætiology—very little space is occupied by purely neurological disorders. . . . This part of the book is profusely illustrated by a series of case histories, and again the general impression is gained that the Service psychiatrist sees the same types of psychiatric disorders whatever the arm to which he may have belonged. Psychopathic personalities have provided many of the psychiatric problems in all the fighting Services, and your reviewer has been struck by the frequency with which Henderson's simple classification is confirmed by Service experience. The authors of this book use the three types of Henderson, the inadequate, the aggressive, and the creative. It is obvious, perhaps, that the Royal Air Force would be especially troubled by the aggressive psychopath, with his desire for easy notoriety, for speed and for adventure. One seems to have met them not infrequently in R.A.F. uniform all over the world, given to "line shooting," defiant breaches of discipline, the accidental destruction of our own aircraft and to general aggressive conduct not always entirely unsuccessful! The authors point out that the creative type of psychopath is of special interest to the psychiatrist in that they may become flying pioneers and record breakers. It is quite true that many of this type possess almost insane courage, but their social adjustments are seldom adequate or satisfactory.

There is much in this book which will be of stimulating interest to all psychiatrists with Service experience and it may be recommended to physicians on account of its interesting and instructive case histories. The index appears accurate but a future edition would benefit by a brief bibliography.

DEMONSTRATIONS OF OPERATIVE SURGERY FOR NURSES. By Hamilton Bailey, F.R.C.S. Edinburgh: E. & S. Livingstone, Ltd. 1945. Pp. viii + 348. Price 21s. net and postage 7d.

This is a new approach to the teaching of operative surgery to the members of the nursing profession. As the reviewer understands it, it is expected that the trainee Sister should read beforehand the operation she is going to witness and refer to it again when she comes out of the theatre.

The book itself is prepared with the usual care which Mr. Bailey bestows on his publications. The list of contributors is impressive, the descriptions are clear and easy to read and the book is amply illustrated, there being no less than 531 illustrations in this volume of 337 pages. The book is divided into ten sections: General principles, abdominal, genito-urinary (rupture of the bladder should more properly have been included in this rather than in the abdominal section), rectal, gynæcological, thorax and breast, head and neck, nervous system, limbs and operations appertaining to the special departments and the total number of demonstrations is 83. The subject matter, therefore, covers most of the routine operations and some less common ones are also included. Each demonstration is preceded by a clinical address, brief but adequate and practically every step of the operation is illustrated, and I liked the constant reiteration of "swabs correct."

I would not agree with the cutting through of Poupart's ligament in the operation for strangulated femoral hernia, surely it is exceptional to have to do this and it should not be a routine. Nor has cholecystectomy by Thorek's method supplanted the classical operation, and it is considered that reference should have been made to the latter, which is still a routine in most hospitals.

In describing partial gastrectomy, the object of fixing a diathermy pad on the patient's thigh is not stated and no further reference to it is made.

In fig. 501 it is difficult to see clearly the laryngeal syringe.

Apart from these minor comments I have found the book well worth reading and it will, I know, be warmly welcomed by the members of the nursing profession.

The author and his collaborators are to be welcomed on the production of such a volume.

S. M. V.

HANDBOOK OF DIAGNOSIS AND TREATMENT OF VENEREAL DISEASES. By A. E. W. MacLachlan, M.B., Ch.B.Edin., D.P.H., F.R.S.Ed. Edinburgh: E. & S. Livingstone, Ltd. Pp. 371. Price 15s.

This is a clearly written elementary textbook on venereal diseases, and is suitable for students and recent graduates. It will be of less value to the experienced specialist, and it does not profess to be a work of reference. The teaching is detailed, reliable and practical; it follows modern trends and developments but avoids controversial views. The illustrations are numerous and the majority are helpful in supplementing the text. The index is adequate and accurate. The style is heavy at times, for the author is fond of a series of long adjectives. The Service specialist will find in these pages a helpful guide to civilian practice, as he is likely to be unfamiliar with many of the chronic complications described. But some of the treatment procedures, such as the use of Mill's suction bougie and Kollmann's dilator, are now only of historic interest and would be better omitted. The treatment of genital warts with podophyllin has been omitted, fuller directions for the treatment of simple urethritis would be appreciated, and the twenty-six-week continuous mapharside-bismuth treatment of syphilis is not very clearly detailed. These are minor criticisms and suggestions, and the book can be recommended as the best elementary textbook on venereal diseases available at present.

The publishers deserve credit for a book which is very well printed and made, and which shows no sign of "utility" standards.

THE SURGERY OF REPAIR, INJURIES AND BURNS. Second Edition. By Wing-Commander D. N. Matthews, *O.B.E.*, M.A., M.D., M.Ch.Cantab., F.R.C.S., R.A.F.V.R. Blackwell Scientific Publications Ltd. Price 45s.

The author has presented his subject under four heads.

Part I deals with the technique of immediate repair of soft tissue injuries and of facial fractures, including pre-operative management.

Part II deals with the technique of subsequent repair of soft tissues including skin, nerve, tendon, etc., and also the repair of skeletal face injuries.

Part III covers problems of facial repair and Part IV deals with burns.

A great deal of information of value to Army Surgeons is here concentrated within the compass of one reasonably sized volume, and the book is recommended for inclusion in Military Medical Libraries.

D. C. B.

Notices.

AIRBORNE MEDICAL SOCIETY.

It has been decided to enlarge the membership to all Medical and Dental Officers who are eligible for membership of the Airborne Forces Club. That, in fact, includes all medical and dental practitioners whose business it was or is to go to war by parachute or glider.

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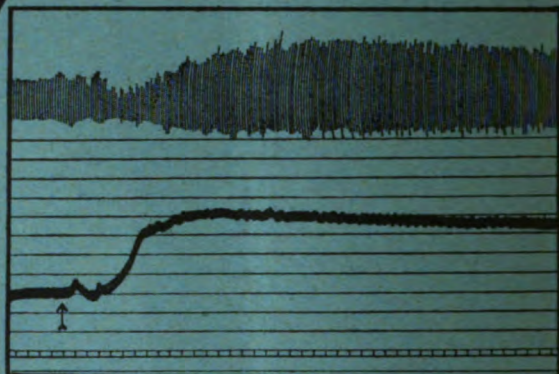
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Original Communications.

OCULAR DISTURBANCES ASSOCIATED WITH MALNUTRITION.

BY

C. DEE SHAPLAND, F.R.C.S.,
Late Lieut.-Colonel Royal Army Medical Corps.

IN a Secret Session of the House of Commons held on April 23, 1942, Mr. Winston Churchill made the following grave pronouncement with regard to the capitulation of Singapore: "According to the War Office figures, about 100,000 men had gathered in the island of Singapore by the morning of February 3. On the night of February 8, about 5,000 Japanese made a lodgment on the north-western corner of the island and were gradually reinforced by landings from other points until perhaps 30,000 men had been landed. After five or six days of confused but not very severe fighting the Army and fortress surrendered. The Japanese have not stated the number of prisoners they have taken but it does not seem that there was very much bloodshed. This episode and all that led up to it seems to be out of harmony with anything that we have experienced or performed in the present War."

This was indeed "the greatest disaster to British arms which our history records" and disastrous, too, was it for the unfortunate prisoners who for the ensuing three and a half years were to be kept in filthy prison camps widely dispersed throughout the Far East on a starvation or semi-starvation diet and to be riddled with malaria, dysentery, beri-beri, pellagra and other tropical diseases from which countless thousands were to die. A large number were affected by serious disturbances of vision and ocular diseases which form the subject of our present discussion and not a few have returned with a serious and permanent loss of central vision due to an optic nerve lesion.

Colonel J. H. Anderson of the Australian Army Staff Headquarters in London kindly sent me a copy of an Ophthalmic Report by Major F. Claffy,

A.A.M.C., who was himself a prisoner of war and in charge of Australian and British ophthalmic wards at Changi and Kranji Hospitals.

Claffy describes the ocular disturbances he encountered under three headings, viz.: (1) Retrobulbar neuritis. (2) Corneal degeneration and ulceration. (3) Partial ophthalmoplegias. The first two he ascribed to a deficiency in the B₂ complex and the third to a simple thiamine lack.

Examples of corneal degeneration first appeared early in June, 1942, the condition being characterized by minute, superficial, punctate, greyish opacities usually staining with fluorescein and up to 0.2 mm. in diameter, occurring in one or both eyes—usually both and only visible with a loupe and good illumination. In mild cases as few as two to three discrete spots were present, whilst in severe types there was a generalized involvement of the whole cornea. Sometimes the opacities coalesced to form quite large patches up to 3 mm. in diameter or were arranged in fine horizontal striæ or in multiple branched patterns. These changes were most commonly found in the intermarginal area and occasionally deep striæ were visible. The corneal nerves were unduly prominent and this was a valuable sign in suspected early cases. Vascularization of the cornea was never observed in uncomplicated cases.

Symptoms were slight blurring of vision, irritability of the eyes especially in sunlight, slight grittiness of the lids and lachrymation, but the condition was not infrequently symptomless and only found on routine examination. With suitable treatment it usually cleared up in from two to ten weeks, but some cases were more resistant and remained active for a year or more but without leaving any permanent changes unless ulceration supervened which was a not uncommon complication.

Its incidence was intimately linked with the other manifestations of B₂ deficiency and most of the cases responded to this form of therapy; indeed, the majority of the cases were treated in hospital primarily for a coexistent retrobulbar neuritis, and at one stage no less than 66 per cent of Claffy's cases of the latter showed evidence of corneal degeneration and he states that it was possible in all uncomplicated cases of the corneal condition to prevent the occurrence of the more serious nerve lesion. The corneal changes of ariboflavinosis as described in the literature were not observed, night blindness was relatively rare and the conjunctival changes of vitamin A deficiency were not seen.

Claffy states that a similar condition had been described by a Japanese observer as "Diffuse Superficial (Epithelial) Keratitis" due to a vitamin B deficiency. In his opinion the term keratitis is a misleading one as the condition is apparently not inflammatory, conjunctival or ciliary injection being rare, but essentially a degeneration of the corneal epithelium which usually remains localized to the epithelial layer and only in a very few instances extends deeper into Bowman's membrane.

For local treatment various drops were tried such as guttæ ol. ricini, ol. morrhue and quinine bi-hydrochloride but they had little effect on the condition beyond relieving subjective symptoms. Atropine was found to be unnecessary except in the few cases showing ciliary irritation. Occlusion of the eyes was of

no value as a therapeutic measure. Exposure of the eyes to sunlight was apparently of no significance as a direct cause of the condition, but freedom from exposure did relieve subjective symptoms.

Actual ulceration of the cornea was relatively rare and only occurred in the epidemic deficiency phase of 1942-43. Most of the cases showed evidence of corneal degeneration or retrobulbar neuritis or both, and Claffy makes the significant statement that after the introduction of red palm oil into the dietary the incidence dropped to nil.

The main clinical features were sudden onset, intense conjunctival and ciliary injection, rapid spread of the necrosis, the presence of hypopyon, slow response to treatment and the generally prolonged course. It was almost always unilateral.

The usual routine treatment for corneal ulceration was employed including mydracain as secondary iritis was usually marked, together with vitamin therapy and sulpha drugs.

Claffy states that the first case of corneal degeneration was observed by him on June 10, 1942, within the next few weeks cases increased in number and it was noticed that in a few cases the degree of visual impairment was out of all proportion to the relatively mild degree of corneal opacification. With the demonstration of scotomata present in these cases it was realized that a more serious form of ocular disease was present. The incidence of these cases, which were labelled retrobulbar neuritis, increased rapidly until epidemic proportions were reached in October, 1942, to July, 1943, the numbers of in-patients rising to over 500 at one period. After this date the incidence diminished, mainly due to the improvement in diet and to the fact that personnel were transferred from the Changi area. In the succeeding years the disease was more or less kept under control with the introduction of more suitable prophylactic measures, but sporadic cases continued to occur.

Claffy defines this condition as a chronic form of bilateral retrobulbar neuritis with a characteristic syndrome due to the ingestion of an ill-balanced diet deficient in vitamin B₂ complex and characterized clinically by loss of central vision due to the involvement of the papillo-macular bundle, peripheral vision remaining intact except in rare instances.

He stresses the fact that it is not a new disease. Thus Lander and Pallister had described a condition found among the inmates of institutions of Malaya in which the main features were glossitis, angular stomatitis and scrotal eczema. Some also had weakness of the limbs and dimness of vision. Liver, marmite and autoclaved yeast were found to be successful therapeutically. Fitzgerald Moore had described a condition of retrobulbar neuritis in West African natives which was also associated with sore tongue, cracked lips, dry furfuraceous skin, scrotal dermatitis and various nervous manifestations, the patients recovering with marmite if exhibited in time. Also there is quite an extensive Japanese literature on the association of a retrobulbar neuritis with beri-beri.

As regards pathogenesis, Claffy supports the theory of endogenous toxæmia which postulates that, as a result of the ingestion of an ill-balanced excessive

carbohydrate diet—especially in the form of rice and lacking sufficient vitamin B₂ complex through faulty metabolism—an endogenous toxin is elaborated which is neurotoxic and has a special affinity for either the ganglion cells of the macular region or the axis cylinders in the papillo-macular bundle or both and possibly the nerve fibrils of the ophthalmic division of the trigeminal supplying the cornea, so causing the characteristic lesion there.

It is of interest to note that the subchiasmal portion of the visual pathway is alone affected—hemianopic and quadrantic defects as a rule not occurring. The effects are usually bilateral though one eye may be affected first and early treatment may prevent the second eye from becoming affected.

Patients have shown all degrees of impairment of vision from 6/5 to counting fingers at less than one metre when first examined. It would appear that the degree of impairment of vision varies directly with the concentration of the toxin in the blood, and that this concentration is regulated by the patient's natural resistance to it. Thus mild cases were seen in whom, without any form of treatment, a stabilized condition was reached with very little resulting impairment of vision, possibly due to the auto-synthesis of the missing essential vitamin factor. This was an important point to bear in mind especially in assessing the results of various forms of treatment.

Claffy stresses that the first change in the optic nerve is failure of conduction of nervous impulses without destruction of nerve tissue, and hence complete recovery of visual function is possible at this stage, but if the toxin is sufficiently concentrated and allowed to act for sufficient time then degeneration of nervous elements takes place with resulting permanent visual loss. Hence the importance of early treatment.

The disease affected all ranks, of all ages, sedentary and manual workers and those working in or out of the sun. As regards predisposing causes excessive rice consumption appeared to be the most important factor when associated with insufficient vitamin B₂ complex to metabolize it. It is not a disease associated with starvation, this was conclusively proved in the case of "F" and "H" forces which went up-country, a large percentage of whom suffered semi-starvation. Four hundred were examined on return and the incidence of ocular deficiency disease was found to be very low, less, indeed, than that of personnel remaining at Changi. Most of the old cases under treatment before going north did not retrogress but remained stationary and some even improved. Again at Krangi when the rice ration was practically halved the incidence dropped practically to nil. Patients suffering from this disease were encouraged to eat less rice.

Intercurrent disease played an important part and especially dysentery. Incidence following dysentery was high; the cases were of sudden onset: usually of severe degree; more resistant to treatment, and a relatively high number progressed to partial optic atrophy. Dengue fever and diphtheria were of much less significance and recurrent malaria had apparently no ill-effect.

Claffy considers that tobacco smoking plays no part in the causation of the disease. He found that 12 per cent of personnel affected were non-smokers and that on careful investigation the degree of severity of the lesion was found

to bear no relation to the amount of tobacco smoked. Smokers responded to treatment just as well as non-smokers even when they continued to smoke, although they were discouraged in the rather vain hope that their money would be spent more profitably on any available foodstuffs.

Excessive muscular effort was a contributing factor especially in those unaccustomed to it. A person could remain in a state of subclinical deficiency over a long period at a low basal metabolic level but this delicate balance was easily upset by extra manual work or intercurrent disease.

Loss of weight, "eye-strain" and focal sepsis, in Claffy's opinion, were of no significance in the ætiology.

It is significant that many cases of retrobulbar neuritis showed no other evidence of deficiency disease. Many, however, did exhibit multiple lesions and this was particularly marked in the "epidemic" period of 1942-1943. The following were the most important:—

Painful Feet—a peculiarly painful condition affecting the lower extremities. At the height of the epidemic 75 per cent of cases were affected, but this figure fell to 2 per cent by December, 1943.

Corneal Degeneration—the percentage affected varied from 66 per cent in December, 1942, to 15 per cent in December, 1943.

Stomatitis and Glossitis—at varying periods 30 per cent to 80 per cent showed evidence of these conditions.

Scrotal Dermatitis—up to 80 per cent affected.

Claffy states that the association of retrobulbar neuritis with the above-mentioned conditions could possibly point to a fairly definite syndrome associated with lack of vitamin B₂ complex, always bearing in mind, however, that many cases were uncomplicated by any other evidence of avitaminosis.

About 1 per cent were associated with nerve deafness, and of 8 cases of spastic paralysis examined only 1 showed evidence of a retrobulbar neuritis.

Claffy makes the interesting observation that during an epidemic of pellagra none of the cases examined showed any evidence either of retrobulbar neuritis or of degeneration of the cornea, the only ocular finding being a conjunctivitis of mild degree, and the very few cases of associated beri-beri—both neuritic and œdematous—he considered of the utmost significance. Indeed, it was noticed that during the epidemic period very few cases of beri-beri were encountered, most probably due to the general prophylactic issue of rice polishings given at the time but, in his opinion, these had no effect in controlling the incidence of the ocular disease.

The important symptom in uncomplicated cases was blurring of vision, one eye often being affected first, and the onset might be sudden or gradual. The patient with high critical faculty would report when he noticed slight difficulty with reading, the print becoming hazy and letters tending partially to disappear. The majority, however, were seen at a later stage when distant vision had become affected, there was then difficulty in recognizing features and blind spots were noticed. Other symptoms were headache (a very common symptom, however, even under normal conditions), aching and pains behind the eyes and irritability in the sun.

Impairment of vision on Snellen's type was of all degrees. In very mild examples there might be apparently normal vision—6/5 in either eye, whilst in severe cases central vision was reduced to counting fingers at less than a metre. Fine involuntary movements of the eyeball in all directions on fixation—searching ocular movements—was a valuable positive sign but usually only present when the visual acuity was 6/18 or less. Pupillary reactions were generally normal, but in the more severe degrees reaction to light might be sluggish and not well maintained. Accommodation and consensual reactions were normal.

In the great majority of cases the fundi appeared normal. There might be blurring of the disc margins which varied from that of physiological degrees to a mild papillitis which was present in only 1 per cent of the cases. In general the appearance of the fundi gave no indication of the severity of the disease. Retinal hæmorrhages were present in 1·5 per cent; they were usually situated near the disc margin, in the superficial layers of the retina and varied considerably in size. Temporal pallor of the discs occurred, but it was an unreliable sign and did not give an indication of the degree of visual loss. Some cases with severe impairment of vision even after three years had normal fundi, whilst conversely it was not uncommon for cases with physiological temporal pallor to be referred to hospital as examples of nutritional optic atrophy. In a few of the worst degrees of visual failure, however, there was marked pallor of the whole disc together with narrowing and shrinkage of the retinal blood-vessels.

Scotomata were almost always demonstrable. They were usually absolute but in very early stages might be relative and were most commonly paracentral or central in position but centro-caecal and annular examples also occurred. The size varied according to the degree of severity from minute "flicker" to 1/1000 red and green up to large central scotomata to 20/1000 white. Unlike tobacco amblyopia there was no disproportion between white and colours; in early cases it might be possible to demonstrate scotomata to colours before white, but the latter was usually demonstrable if the object were small enough and the intensity of illumination reduced.

Peripheral fields of vision usually remained intact. Sometimes there was slight generalized peripheral constriction, but only three of Claffy's cases showed any serious loss of peripheral field.

If untreated and of severe degree vision becomes progressively worse and may be reduced to counting fingers. Degeneration of nerve fibres is followed by an irreversible secondary optic atrophy, but total blindness does not occur in uncomplicated cases. In less severe degrees the process may stop at any stage and the condition become stationary as if a tolerance to the disease had been acquired, but this could easily be upset by any factors lowering bodily resistance or by a further reduction of vitamins in the diet.

With treatment it was possible to stop the progress of the disease. The prognosis was excellent in cases with short history and slight impairment of vision; it was correspondingly less favourable the longer the history and the

greater the loss of visual function, and was very unfavourable in those giving a history of more than two months without treatment.

In the majority, however, prognosis was favourable, many improving from less than 6/60 to 6/6. Under treatment improvement usually commenced in the second or third week with maximal effect in the first eight weeks and a slow steady improvement during the first six months provided the patient's vitaminic balance remained normal. Relapse was always possible but, after six months, in uncomplicated cases, a stationary stage was usually reached from which no further improvement was to be expected with treatment although isolated examples of improvement up to eighteen months did occur. Treatment had very little effect on cases which, when first seen, had progressed to the stage of optic atrophy.

Of some 1,300 patients treated in hospital 95.5 per cent showed improvement, 4 per cent remained stationary and less than 0.5 per cent retrogressed.

From the beginning all cases were treated on the assumption that this condition was a manifestation of a vitamin B₂ deficiency, the aim of treatment always being to supply vitamin B₂ in maximal dosage from whatever sources were available at the time. Controlled experiments without vitamin B₂ as a basis of treatment were considered harmful and condemned as it was recognized early to be a serious disease and capable of causing a grave loss of vision.

All cases received marmite, the most concentrated form of vitamin B₂ available, but supplies were always limited and occasionally failed. Hence other forms of possible therapy were investigated to assess their therapeutic value, thus rice polishings, kacang hijau, soya bean, nicotinic acid, extra protein, red palm oil, green leaf and grass extract, local greens, "changemite" yeast, riboflavine and multi-vitamin tablets were all employed at times.

The dosage of marmite varied with the amount available as supplies were always limited but averaged 1 ounce by weight for the first week in severe cases, then $\frac{1}{2}$ ounce daily for the next four to ten weeks according to the response to treatment. During the last twelve months at Kranji Hospital none was available and recourse had to be taken to other measures, and at one stage it became necessary to transfer affected personnel back to Changi where marmite was still forthcoming. In 1943, towards the end of the epidemic phase, adequate dosage was not always possible and in July of that year supplies failed for a short time—it was during this period that cases began to retrogress.

Kacang hijau given in doses of 4 to 10 ounces daily was found to be a valuable adjunct to treatment especially when marmite dosage had to be reduced as it was then found possible to control the disease with smaller dosage of marmite; its prophylactic value also was high.

Local greens were important, especially in the last year when little else was available. The most valuable were kang kong, chica mania and Chinese spinach in that order in doses from 4 to 8 ounces daily. Sweet potato tops were of little value.

Soya bean was of very great value both in prophylaxis and treatment, the dosage employed was 2 to 6 ounces daily.

Red palm oil in doses of $\frac{1}{2}$ to 2 ounces daily was important in that it was the only source of fat available and helped towards a more balanced diet, and, as fat, helped to conserve vitamin B₂. Claffy considers that its high vitamin A value was of no significance in cases of retrobulbar neuritis. Its value in cases of corneal degeneration has been mentioned, and at first it was considered that this corneal condition may have been an "A" deficiency but later evidence pointed to it also being a "B₂" deficiency.

"Changemite"—a locally produced concentrated yeast extract was of value, and multi-vitamin tablets (vitamin A 2,500 USP units, vitamin D 200 USP units, thiamin chloride 1.0 mg., riboflavine 1.5 mg., ascorbic acid 37.5 mg., nicotinamide 10 mg.) if given in sufficient dosage—8 to 10 daily—were of definite value in both ocular conditions.

Riboflavine in doses of 3 to 5 mg. daily was tried on a small series of cases of corneal degeneration, some of which were of long standing and had been resistant to other forms of treatment, with beneficial effect.

Rice polishings were given in daily dosage of from 2 to 10 ounces daily and also in the form of extract. Cases treated with either alone showed steady retrogression and, although rice polishings did control the thiamine deficiency diseases, Claffy considered that they did not contain the necessary factor of the B₂ complex either to prevent or to be of value in the treatment of the ocular diseases.

Grass and green leaf extracts, nicotinic acid and extra protein were tried without beneficial effect.

Sporadic cases of partial ophthalmoplegias occurred throughout the years associated with other lesions of neuritic beri-beri. An interesting series occurred, however, in July, 1945, when ocular symptoms were the only evidence of the deficiency. These were progressive difficulty in keeping the eyes open during the day, worse at night, and diplopia. Bilateral ptosis and paresis of the third and sixth cranial nerves were noted associated with paresis of the accessory and cervical nerves with consequent difficulty in holding the head up. All these cases responded well to large doses of thiamine chloride.

Claffy also mentions a small series of cases in which the findings were those of a typical renal retinopathy with marked œdema of the retina, multiple hæmorrhages and exudates and extremely attenuated retinal vessels, the cases being associated with gross generalized œdema, elevated blood-pressure and urine of low specific gravity with or without albumen. One such had bilateral detachments of the retina, almost complete, which cleared up when the general condition improved. The changes in the blood-vessels were of a permanent character. I had a similar case under my care at Shenley Military Hospital in a repatriated P.o.W. from Germany in whom, however, no evidence of renal dysfunction was found.

Colonel C. V. D. Rose, I.M.S., Ophthalmologist, who was also a prisoner at Changi, told me that the majority of the cases of corneal ulceration appeared quite early in 1942—a few weeks only after the capitulation and that such cases were not frequent in the later years. The ulceration typically began in the

centre of the cornea, was associated with iritis and hypopyon and cases generally did well with carbolizing and mydrin.

Cases of corneal degeneration or "granular" cornea appeared in the summer of 1942, the eyes were generally white, the corneal epithelium, chiefly in the interpalpebral area, appeared "lumpy" but was not exfoliated, vision was affected but not severely and increased peri-limbal vascularization was not observed.

Colonel Rose stated that the Japanese had three grades of rations, one of 1,600 calories for working parties, 1,200 calories for non-workers and 800 calories for hospital patients. This ration was made up almost wholly of rice with a teaspoonful of sugar a day, fresh vegetables, however, were obtainable. The prisoners received 15 to 20 cents a day working pay; they could never afford more than ten cigarettes a day and the tobacco—Javanese—was of excellent quality. Alcohol was never available.

Colonel Rose was of the opinion that rice polishings were of therapeutic value in the treatment of cases of retrobulbar neuritis but only if taken in large doses—10 to 14 ounces daily.

The first case of nutritional retrobulbar neuritis that I personally observed was seen at Millbank on June 6, 1945, in a Major of the I.M.S., who had been flown back from Rangoon. From that date there was a small trickle of such cases until the end of October, 1945, when, with the arrival of transports in this country bringing back prisoners of war from all over the Far East, this trickle became quite a flood and up to March 31, 1946, some 975 cases were referred to the Ophthalmic Department at Millbank from Repatriated Prisoners of War Boards for a specialist opinion on their eye condition. The majority of these cases were seen by myself and my colleagues Major A. J. Cameron, Major J. C. MacGregor and Captain J. Gibson-Moore during the last two months of 1945 and the first two months of 1946.

Of this number 777 were pure refractive errors with no physical signs of organic disease in either eye apart from squint, 60 were examples of a serious past retrobulbar neuritis with corrected vision of 6/18 right and left or less, 44 of a past retrobulbar neuritis with corrected vision of all degrees from 6/5 to 6/18 but still showing central field defects, 45 had a history of visual disturbance during captivity, showed temporal pallor of the discs but with corrected vision standard and no demonstrable scotomata, while 49 were examples of other ophthalmic diseases.

These figures are shown in this table in which they have also been expressed as percentages :—

TABLE I.

Total cases	..	..	..	..	975		
Pure refractive errors	..	..	..	..	777	..	79.8 per cent.
Retrobulbar neuritis (severe)	..	..	..	..	60	..	6.1 per cent.
Retrobulbar neuritis (slight)	..	..	..	..	44	..	4.5 per cent.
Pallor of the discs only	..	..	..	..	45	..	4.6 per cent.
Other ocular diseases	..	..	..	..	49	..	5.0 per cent.

Major Mrs. Stewart, at the Royal Herbert Hospital up to the end of March, 1946, had seen 411 repatriated Prisoners of War and of these 25 were examples

of a severe past retrobulbar neuritis with corrected vision of less than 6/18 in each eye, and again the percentage is exactly 6·1. All this figure means, of course, is that in a large series of prisoners from the Far East who complain of past or present visual disturbance or ocular symptoms and have been referred for a specialist opinion about 6 per cent will be found to have signs of a past and serious optic nerve lesion.

A short analysis of 100 of the cases showing refractive errors only gave an average age of 31·7 years. It showed that cases were referred as they had previously worn glasses and wanted a retest, on account of a squint or an amblyopic eye, and a few on account of headaches. Difficulty with or even inability to read which had developed during captivity was a common cause for such reference, and, apart from the older man of presbyopic age, affected rather more than a third of those with hypermetropia, hypermetropic astigmatism and emmetropia. Those with myopia naturally suffered much less in this respect. This fatigue of the ciliary muscle with consequent manifestation of hypermetropia was therefore a common cause of visual impairment, chiefly for close work, during the period of captivity, and was due no doubt directly to the general state of inanition.

Table II gives the ophthalmic diagnoses in the 49 cases which were classified under "other ocular diseases."

TABLE II.

Corneal nebulae	23	Dacryocystitis	1
Battle injuries	6	Glaucoma	1
Cataract	5	Iritis, recurrent	1
Choroido-retinitis	4	Pingueculæ, inflamed ..	1
Keratitis—deep	2	Pterygium	1
Intra-ocular hæmorrhage ..	2	Retinal cysts	1
		(bilateral symmetrical)	
		? Trachoma ..	1

The corneal nebulae were all the result of ulceration which occurred during the period of captivity, such lesions due to eye disease before capture not being included. Thirteen cases had one eye affected, the remaining ten both eyes and in one of the latter there had been a perforation in each eye with a consequent dense leucoma adherens, right and left. This man had been interned in Borneo and the ulceration occurred in April, 1943, when he was working in a China clay quarry.

Of the five cases showing cataract, one was of the ordinary cuneiform senile variety in a R.S.M. of 53 years, one a traumatic cataract following a blow on the right eye by a coconut in March, 1942, whilst the remaining three were posterior cortical cataracts—unilateral in one and bilateral in the remaining two and here also associated with anterior cortical lens opacities; as the ages of these patients were 35, 28 and 26 years respectively and the visual failure occurred during the period of captivity they may well have been nutritional in origin.

Of the cases showing foci of choroido-retinitis, one in whom the blood Wassermann and Kahn reactions were positive showed an old anterior choroido-retinitis in both eyes, two had solitary patches of old choroiditis which could have been of considerable chronicity whilst the fourth showed an interesting

little lesion at his left macula which may well, however, have resulted from a past photo-retinitis as he had been in civil life a studio lighting technician and in the Army had worked with searchlights up to the time of his capture.

The two cases showing signs of a past deep keratitis both gave a history of having had "corneal ulcers" in 1943—the right eye being affected in one and the left in the other. The affected corneæ showed fairly dense scarring with deep vascularization and vascular ghosts as in old interstitial keratitis and also signs of a past iritis were present. The Wassermann and Kahn reactions in both cases were negative.

The two cases of intra-ocular hæmorrhage, one of which was in the macular region and the other apparently into the vitreous, both occurred in a severe attack of malaria and this was probably the ætiological factor.

The case of glaucoma was in a man of 40 years who, in February, 1943, had developed an ulcer of his right cornea. He received no local treatment for this and glaucoma supervened. As there was only a very limited supply of eserine available he could only use the drug in the more severe attacks and consequently he arrived back in this country with the eye in a state of absolute glaucoma.

The one case of a possible trachoma was referred to Mr. A. F. MacCallan for his opinion and he reported—"the upper tarsal conjunctiva shows very marked papillary hypertrophy with superficial epithelial œdema so that some of the papillæ are so much swollen as to resemble the bleb-like excrescences of Trachoma Stage I. The corneal periphery shows a slight regular advancement of the limbus but does not present the characteristic neo-vascularization of trachoma. I believe the diagnosis to be one of superficial punctate keratitis with secondary non-specific papillary hypertrophy."

This complete absence of trachoma in a large series of men returning from such diverse parts of the Far East and who had existed under such dirty and debilitating conditions is worthy of note.

Of the 60 cases showing signs of a past and severe retrobulbar neuritis and with a corrected visual acuity of 6/18 or less in each eye, 19 were unwilling for various reasons to be admitted to hospital for investigation and treatment, and as they were all on repatriation leave the matter was not pressed. The remaining 41 cases, together with 3 that I took over from Major Mrs. Stewart, were admitted to Shenley Military Hospital where they came under the charge of Major A. M. Roy, and when the ophthalmic ward there was closed in the middle of January, 1946, they were admitted to the Q.A.M.H., Millbank, where they were looked after by Major J. C. MacGregor.

A full history was taken from each of these 44 cases with special reference to the location of their internment and their illnesses during captivity; the question of alcohol and tobacco was gone into, also the date of visual failure and whether sudden, rapid or gradual. The visual acuity, both distance and near, unaided and corrected, was recorded on admission and again on discharge. Each case had a thorough ophthalmological overhaul which included fundus examination with especial reference to discs and maculæ, and a slit-lamp examination with especial reference to the cornea and limbus; peripheral

fields were charted once and scotometry was undertaken both on admission and discharge.

General investigations included a complete neurological examination by a neurologist, a blood Wassermann, or Kahn or both, a radiogram of skull, sinuses and lung fields, a clinical examination by an oto-rhino-laryngologist including in most a tonsillar swab, a dental inspection and an examination of the stools for parasites.

Treatment of these cases consisted in a very full, generous, and varied diet averaging some 3,500 calories daily, and the first 14 were given in addition an injection of Benerva (pure aneurin hydrochloride) 25 mg. and 9 tablets of riboflavine 1 mg. daily. The remaining 30 patients were kept on the same diet but received in addition 1 ounce of marmite each day.

In assessing any possible visual improvement during their stay in hospital a gain of one line on the Snellen type or one step up on the Jaeger card in one or both eyes has been disregarded as being possibly due to enthusiasm on the part of the patient or examiner or both. On this basis 2 of the first 14 cases showed a slight improvement in distance acuity, 1 from 6/36 6/24 partly to 6/18 pt. 6/18 and the other from 6/60 right and left to 6/36 and 6/24, but 5 showed appreciable improvement in near vision. Of the 30 cases kept on marmite none showed any appreciable change in distance vision but 3 showed improvement in reading. The average length of stay in hospital of the latter series was only 3.3 weeks, however, as compared with 7.8 weeks for the first 14 cases.

The disease affected all ranks and all ages—the youngest in this series being 24, the oldest 51 and the average 31.3 years which corresponds very closely with the 31.7 years of the control series of 100 cases showing refractive errors only. All had suffered from other tropical diseases during the course of their captivity, beri-beri being the most frequent (32), then malaria (28), dysentery (20), pellagra (15), tropical ulcers (13) and dengue fever (8), whilst many had suffered from a combination of these diseases.

All patients were agreed on the entire absence of any alcoholic intake during their captivity and whilst only 3 were definitely non-smokers, the cigarette ration in the remainder rarely exceeded ten a day and for those incarcerated in Japan the average ration was only five a week. Alcohol and tobacco, therefore, in my opinion, can be excluded as causal factors in this condition.

The majority of the visual failures occurred between June and December, 1942, the earliest being April, 1942, in a patient who was captured at Hong Kong and the latest in November, 1943, in a patient who was captured at Singapore and was moved to Thailand in March, 1943. This latent period of four to five months, noted both at Hong Kong and Singapore, before the symptoms of the ocular condition appear is of interest. In 24 of the cases the visual loss was gradual, i.e. over two weeks, in 5 it occurred in two weeks or less, and in 14 it occurred within twenty-four hours.

Fundus examination of these cases showed temporal pallor of the discs in all which varied, however, from a patch of greyness affecting a narrow segment temporally up to a generalized atrophy of the whole disc. None of them showed

any appreciable contraction of the retinal arteries, though occasionally in the more severe there did appear to be some narrowing of the macular arterioles. The maculae appeared normal in all the eyes except one in which there was some slight pigmentary disturbance around the fovea.

Seven cases showed some increase of the perilimbal capillary plexus but this was only to a marked extent in one in which there was an arcus below in each eye associated with some fairly large new vessels which tended to run circumferentially about 2 mm. from the limbus of the lower half of the cornea.

Peripheral fields were full in all cases to a 3/330 white target. Scotomata were demonstrated in all but 2 of the cases 1 of whom was illiterate and not co-operative and the other, taken over from the medical division, was a relatively mild case. Scotomata were in general charted to a 2/1000 white target and were mostly paracentral or central in position although peri-central defects were not uncommon and centro-caecal examples also occurred.

A complete neurological examination was undertaken in 37 cases—5 only showed any physical signs, 1 a slight posterior column loss and 4 signs in the legs indicative of a nutritional polyneuritis, 1 severe (30 per cent disability), 1 moderate and 2 slight. The blood W.R. or Kahn was negative in the 41 cases in which it was taken.

In the first 14 cases the skull X-ray was undertaken with special reference to the pituitary fossa and 1 only showed any abnormality the diaphragma sellæ being calcified across. In the remaining 30 the skull was X-rayed with especial reference to the optic foramina but nothing abnormal was revealed. In general, the radiograms of the sinuses and lung fields did not show any signs of active disease.

There was but little focal sepsis revealed by the E.N.T. examinations—3 cases showed a chronic suppurative otitis media, 1 pus in an antrum and 1 a bilateral nerve deafness. It is of interest, however, that of 26 cases in which a tonsillar swab was taken no less than 92 per cent grew hæmolytic streptococci. In general, oral hygiene was good and the patients required but little dental treatment.

There was a rather high infestation with intestinal parasites, 22·5 per cent having ova of *Ascaris lumbricoides* in their stools and 12·5 per cent those of *Ankylostoma duodenale*. Two of the cases infected with ascaris also harboured the whip-worm—*Trichuris trichiura*.

It is of interest that of these 975 cases only 5 spontaneously complained of night blindness and that not one of these 5 cases showed any evidence of a nutritional optic neuropathy.

In conclusion I wish to express my indebtedness to my colleagues of London District—Majors A. J. Cameron, J. C. MacGregor, A. M. Roy, M. A. Stewart and Captain J. Gibson-Moore for their enthusiastic help, also to Lieut.-Colonel S. Nevin, Command Specialist in Neurology, Eastern Command, for the neurological examinations, to the pathological and radiological departments at Shenley and Millbank for their valued help in this investigation.

MEDICAL ARRANGEMENTS FOR THE CONTACT AND RELIEF OF ALLIED PRISONERS OF WAR AND INTERNEES IN SOUTH-EAST ASIA.

BY

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INTRODUCTION.

THE object of this paper is to provide a brief description of the medical organization and arrangements made to support air operations for the contact and relief of Allied Prisoners of War and Internees throughout the countries occupied by the Japanese Forces in South East Asia.

It is realized that this paper deals with events which are already in the dim past. It is submitted, however, that the special features which are stressed in this paper provide some interesting information on medical organization and planning which is possibly unique in the history of the Medical Services.

There were known to be about 229 camps containing some 122,900 Prisoners of War and Internees. These camps were widely scattered throughout each country with varying numbers as follows :—

				<i>Civil</i>	
<i>Country</i>				<i>Internees</i>	<i>Total</i>
Burma	..	..	1,100	100	1,200
Malaya Peninsula	..	..	4,940	—	4,940
Singapore Island	..	..	13,300	3,300	16,600
Siam	..	..	28,640	170	28,810
F.I.C.	..	..	6,150	30	6,180
Java	..	..	27,000	28,840	55,840
Sumatra	..	..	7,700	1,700	9,400
				<hr/>	<hr/>
				88,830	34,140
					122,970

Much information had been accumulated regarding the conditions under which the Allied Prisoners of War and Internees were forced to live, the location of camps in each country, the treatment meted out during their internment by the Japanese military authorities, their general health, and the diseases which the Medical Services would be called upon to treat. This information was obtained from a variety of sources, notably from the interrogation of captured enemy prisoners and also from guerillas working behind the enemy lines in occupied territories.

The organization, training and equipment of these guerillas make them particularly suitable for their role and nearly all were parachute trained.

Members of these forces had operated or were operating in enemy occupied territory and were familiar with local conditions in the various countries.

OPERATIONS TO, CONTACT AND SUCCOUR
ALLIED PRISONERS OF WAR AND INTERNEES.

OPERATION "MASTIFF."

About August 12, 1945, it was obvious that an early surrender of the Japanese forces might be expected and that this event would occur long before the ground troops of the relieving forces could reach Prisoner of War camps.

The whole of the available strength of the guerillas, who in some cases had medical resources, were therefore directed to the contact, recovery and succour of the Allied Prisoners of War and Internees. It was realized, however, that these resources would be insufficient to deal with the large number of Allied Prisoners of War and Internees involved and the urgent necessity would arise to air-drop further assistance in medical personnel, medical supplies, special foods and clothing.

Plans were therefore rapidly evolved to introduce by air-dropping into all camps or groups of camps in the vast area medical assistance and comforts and Staff Officers to organize camps for evacuation and prevent premature dispersal of those in the camps. This operation at first covered camps in Malaya and Singapore, but ultimately extended its activities to cover French Indo-China, Siam, East Burma, Sumatra and Java. Arrangements were also made to extend this operation to Borneo and the Celebes. This part of the operation was known as MASTIFF "A". It was further planned to provide an air maintenance programme of medical stores, special foods and clothing, known as MASTIFF "B."

Control.—It was obvious that an operation of such magnitude necessitated the collaboration of all Services. A Central Control was therefore set up in the Headquarters of the Supreme Allied Commander, South East Asia, where representatives *inter alia* of the Supreme Allied Commander, Air Command and the Allied Land Forces of South East Asia and the guerillas all co-operated to carry out the plan. Executive action was vested in Headquarters, Allied Land Forces, South East Asia.

It was realized that to cover this vast area adequately, personnel and supplies of all kinds would have to be positioned at widely dispersed convenient aerodromes, and that it would not be possible to control all countries from Central Control at S.A.C.S.E.A., since communication would be dependent on wireless from each country and the distance would prevent adequate contact being maintained. It was therefore decided to set up Sub-Controls in Colombo, Calcutta and Rangoon under the supervision of Central Control, S.A.C.S.E.A.

The countries covered by MASTIFF Central Control and Sub-Controls were as follows :—

MASTIFF Central Control	Malaya,	Aircraft operating from Min-
and	Singapore,	neriya in Ceylon and from
Sub-Control, Colombo :	Sumatra,	Cocos Island.
	Java	

Sub-control, Calcutta :	Eastern, Central and Southern Siam, French Indo-China.	Aircraft operating from Jessore.
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Sub-Control, Rangoon :	Western Siam, Eastern Burma.	Aircraft operating from Mingala- don.
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Aircraft for dropping personnel and supplies were provided by Air Command, South East Asia, and consisted mainly of Liberators and Dakotas. All were positioned at convenient aerodromes in time for the operation.

Medical Liaison Officers.—Medical liaison officers were specially selected and appointed to each control to give technical advice and assistance on the dropping of medical aid and medical personnel. The Officer (Major L. F. Q. MacLaine, R.A.M.C.) appointed to MASTIFF Central Control was kindly provided by the D.D.M.S. (Brigadier T. E. Davidson R.A.M.C.) 1st Airborne Corps. The other Medical Officers were provided under arrangements made by H.Q., A.L.F.S.E.A.

The medical officers appointed to controls were carefully instructed in their duties, which included :—

- (a) Technical advice in interpreting requests from guerillas.
- (b) Assisting in types of medical supplies to be dropped and arranging sorties in conjunction with Staff.
- (c) Advising on dropping of medical officers and nursing orderlies.
- (d) Issue of instructions to medical personnel to be dropped on advice from Medical Directorate, H.Q., A.L.F.S.E.A.
- (e) Preparing statistical information regarding :—
 - (i) Health conditions of prisoners in camps.
 - (ii) Requirements for medical supplies.
 - (iii) Sorties flown daily and medical stores and personnel dropped on individual camps.

Medical Paratroops.—As soon as it was realized that air dropping of medical personnel would be necessary, steps were taken to obtain volunteers. Immediate signals were therefore despatched throughout South East Asia Command and to India calling for volunteers.

Adequate numbers of medical officers and nursing orderlies who were experienced parachutists were provided and positioned by the date on which MASTIFF was put into operation. The majority of these personnel were provided by 44 Indian Airborne Division and others by 1 Airborne Corps and R.A.F. All were volunteers.

These personnel were formed into teams, each consisting of one medical officer and nursing orderly. In addition, parachute mobile surgical teams, surgeons and psychiatrists were also held in readiness to be moved to any place on demand being made for their services.

All medical personnel were positioned as follows:—

		<i>Personnel</i>
MINNERIYA (Ceylon)	Parachute teams, each consisting of one medical officer and one nursing orderly ..	10 teams
	Parachute mobile surgical unit with operating equipment.	
	Total staff (Officers 3)	10
		(Other Ranks 7)
	Indian nursing sepoy	6
	Psychiatrist (Major R. A. Blair) from 1 Air-borne Corps	1

In addition the following Parachute Reserves were available in Ceylon under arrangements made with R.A.F.

Medical Officers <i>ex</i> Special Force	3
Medical Officers R.A.F.	2
Surgeon <i>ex</i> Special Force	1
Medical Officers R.A.M.C.	2

JESSORE (near Calcutta)	Parachute teams, each consisting of one medical officer and one nursing orderly ..	20 teams
	Parachute mobile surgical unit with operating equipment.	
	Total staff (Officers 3)	10
		(Other Ranks 7)
	Parachute medical officers R.A.M.C.	3
	Psychiatrist (Captain McCammond) <i>ex</i> 44 Air-borne Division	1

MINGALADON (near Rangoon)	Medical teams* each consisting of one medical officer and one nursing orderly	10 teams
	*These personnel were Air Transport only, as information indicated that it would be possible to air land in Burma instead of air dropping.	

Plans for Treatment.—It was appreciated that the initial treatment and dieting of debilitated and under-nourished Recovered Allied Prisoners of War and Internees (R.A.P.W.I.) and, in particular, children, was highly specialized work. It was also apparent that malnutrition and starvation in some degree would be the lot of all R.A.P.W.I. A careful examination of suitable diets was therefore made, and on the advice of Colonel J. J. O'Dwyer, D.D.H. ALFSEA, and Major J. M. Walker, D.A.D. Nutrition, provision was made in conjunction with S. & T. for specialized foods, as it was realized that the digestive powers of all A.P.W.I. would be seriously affected by their long internment.

The advice and opinions of Consultants and Specialists in Medicine, Hygiene, Pathology and Nutrition was pooled, and a comprehensive directive was drawn up regarding diagnosis and treatment of deficiency diseases. The Consultant Physician, Brigadier J. C. Hawksley, an expert pædiatrician, prepared a special brief on the feeding and treatment of children, and also visited aerodromes and discussed all professional aspects with individual medical officers.

All medical officers were in addition given written briefs, and were thus fully cognizant of their duties.

Medical Stores.—Much care and thought were given and the advice of Consultants and Advisers obtained on the preparation of scales of Medical Stores to ensure that adequate stocks of necessary items would be available and positioned in time for the operation.

Two different sets of medical equipment and special malnutrition packs and individual first-aid outfits were provided and positioned according to the number of R.A.P.W.I. for which they were required. Quantities were estimated on the total number of R.A.P.W.I. then known to be located in each of the countries served by the respective Controls.

Adequate stocks were placed at each aerodrome to maintain all Prisoner of War Camps for a period of four to six weeks by air-drop as follows:—

MINNERIYA (Ceylon)	Emergency equipment, MASTIFF "A"	.. 125 sets
	Emergency equipment, MASTIFF "B"	.. 25 sets
	Malnutrition packs .. ..	.. 25 containers
	Individual first-aid outfits	1,000
JESSORE (near Calcutta)	Emergency equipment, MASTIFF "A"	.. 75 sets
	Emergency equipment, MASTIFF "B"	.. 25 sets
	Malnutrition packs .. ..	.. 25 containers
	Individual first-aid outfits	1,000
MINGALADON (near Rangoon)	First-aid outfits, type "A" .. ..	.. 800
	Emergency equipment, MASTIFF "A"	.. 50 sets
	Emergency equipment, MASTIFF "B"	.. 25 sets
	Malnutrition packs .. ..	.. 25 containers
	Individual first-aid outfits	1,000

Each set was estimated at providing adequate medical supplies for 500 R.A.P.W.I. for one week. Emergency Equipment MASTIFF "B" differed from that of MASTIFF "A" in having no non-expendable items. Both sets and malnutrition packs were to be dropped only on camps wherein were R.A.P.W.I. medical officers or into which medical officers were air-dropped, as it was considered that their use was highly technical and would be harmful in the hands of those other than qualified doctors.

The individual first-aid outfits were prepared to meet demands from small isolated camps where there were no doctors. Full and simple instructions were contained in each outfit.

BRIEF PROGRESS OF OPERATION.

Negotiations for surrender with Japanese naval and military authorities caused innumerable delays, but sanction was finally obtained for the operation to commence on August 27, 1945. This enabled the guerillas to declare their presence and openly contact the various Prisoner of War Camps.

The operation commenced with air sorties on August 28, 1945, carrying leaflets to all camps, warning them that help was at hand. These leaflets contained detailed instructions on how Prisoners of War and Internees could help themselves until contact had been made and warning them against loose talk.

Early reports from camps were somewhat alarming and indicated that the number of Prisoners of War and Internees was far greater than that obtained from previous statistical information. They also revealed that there was a very high proportion of dangerously and seriously ill in all camps and that many required prolonged treatment.

All Prisoners of War and Internees were undernourished to some degree, while the majority had suffered or were suffering from varying degrees of vitamin deficiencies, malaria, dysentery and skin diseases.

This gruesome picture rapidly changed with the introduction of medicaments and special diets and it was remarkable how quickly all improved. It was gratifying to realize that while all required some medical treatment, only about 50 per cent required hospitalization for periods of three to seven days and not more than 10 per cent in the worst camps required prolonged hospital treatment for ten days or more.

On August 28, the Japanese authorities in Singapore were ordered to prepare to receive doctors, medical stores and food to be dropped on Changi airfield. They were instructed to place a sign 20 ft. high painted black with "P.O.W." in yellow on the airfield. They were further ordered to collect all stores dropped and hand them over to the camp authorities and to give every assistance to P.O.W. medical officers. On August 30, medical supplies and food were dropped and two medical teams were parachuted on to Changi airfield.

From then on operations extended to all other countries and medical teams, stores and food were dropped as requested.

One item of particular interest is worthy of record. On September 3 it was reported that there was an outbreak of smallpox in the area of Ubon, in Siam, where it was known that there were some 3,240 R.A.P.W.I. Action was immediately taken and 5,000 doses of vaccine were successfully dropped on the morning of September 5.

The operation continued daily and ended on October 15, 1945.

All emergency calls for medical stores were met at once and there was never any shortage or delay in positioning and dropping. In all, some 135 Emergency Equipment Sets and 61 Malnutrition Packs were successfully dropped from aircraft on to all camps.

Throughout the operation at least thirteen medical teams parachuted into Singapore, Malaya, French Indo-China, Java and Sumatra.

SUMMARY.

A brief description is given of the medical organization and planning which supported the air operations which contacted and relieved the Allied Prisoners of War and Internees in Japanese occupied territories in South East Asia in 1945.

ACKNOWLEDGMENT.

I have to thank Major-General W. E. Tyndall, *C.B., C.B.E., M.C.*, Director of Medical Services, Allied Land Forces South East Asia, for permission to forward this paper.

THE INCIDENCE OF STAPHYLOCOCCI IN THE NOSE AND ON THE SKIN OF AFRICANS AND EUROPEANS IN WEST AFRICA.

BY

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IN moist tropical regions, such as West Africa, pathogenic staphylococci are of considerably greater importance than streptococci as causes of morbidity and mortality. Among West African troops, for instance, staphylococcal septicæmia and a form of pyomyositis associated with coagulase positive staphylococci have not only been common but have been responsible for a considerable number of deaths. Little is known as to the source of the invading organisms in these cases.

As part of an investigation into the relationship between staphylococci and tropical pyomyositis it appeared to be of interest to determine the distribution of coagulase-positive staphylococci in the nose and on the skin of Africans in West Africa. Studies on the carriage of *Staphylococcus (pyogenes) aureus* in cooler climates by Hallman (1937) and later by many others (cf. Mills, Williams and Clayton-Cooper, 1944) have shown that in the case of healthy adults the percentage of carriers varies from 22 to 47·4 per cent in the nose and from 5 to 24 per cent on the skin. The percentage of those carrying staphylococci on the skin is always less than that of those carrying staphylococci in the nose.

In the present investigation 300 Africans and 100 Europeans were examined. All were living in or around Accra on the Gold Coast Littoral which, though one of the drier regions of West Africa, nevertheless has a constantly high relative humidity except during the few days in December and January when the hot dry Harmattan, blowing from the Sahara, has sufficient force to reach the coast. The examinations were made from March to November, a period that is to say embracing both the early and late rains and the intervening drier period during August and September.

The Africans were divided into two groups, 150 soldiers and 150 villagers. The first group consisted of approximately equal numbers of nursing orderlies and other hospital attendants and of soldiers in hospital suffering from medical conditions. This group thus contained only adult males from 18 to 40 years of age.

The second group was made up of villagers from the Fulani Zongo, an overcrowded and poorly sanitated slum area on the outskirts of Accra. Facilities for washing were limited in the village and the general hygienic conditions were

far inferior to those of the first group. Yaws and such abnormalities as crazy pavement skin were common while tropical ulcers were by no means rare. All ages and both sexes were included in this village group.

As a comparison with Africans, similar examinations were made of 100 Europeans. Approximately half the Europeans were nurses, medical officers and R.A.M.C. personnel; the remainder were officers and British other ranks from units in the neighbourhood of Accra. Their length of service in West Africa varied from two months to four years, with an average of eleven months.

TECHNIQUE.

The technique employed was very similar to that used by Mills, Williams and Clayton-Cooper (1944), except that owing to the difficulty of ensuring the sterility under tropical conditions of large numbers of blood-agar plates these were eliminated. Sterile swabs moistened with peptone water were rubbed on a circular area of skin approximately 3 cm. in diameter on the back of the right wrist while others were taken from both nostrils. The swabs were at once inoculated into 9 ml. of sterile nutrient broth to which had been added immediately before inoculation 1 ml. of distilled water containing potassium tellurite, so that the final concentration was 1 in 2,000.

The screw-topped bottles containing the tellurite broth were incubated at 37° C. for from twenty-four to forty-eight hours. Subcultures were made on nutrient agar and incubated for a further eighteen to twenty-four hours. Colonies were then identified as Gram-positive cocci and suitable colonies were inoculated into nutrient broth for the coagulase test.

The coagulase test was performed by mixing equal volumes of a twenty-four hours' broth culture of the organism and of a 1 in 10 dilution of fresh human plasma in 3.8 per cent sodium citrate in water. The mixture was incubated for three hours at 37° C. Dried human plasma, as supplied by the Army Transfusion Service, after reconstitution failed to give satisfactory readings with known coagulase-positive staphylococci. The results of the test are shown in the table.

Group	Total No. examined	Total No. carrying coagulase + organisms	No. with coagulase + organisms on skin	No. with coagulase + organisms in nasopharynx	No. with coagulase + organisms both on skin and nasopharynx
African Soldiers	150	40 (26.6%)	14 (9.3%)	35 (23.3%)	9 (6.0%)
African Villagers	150	42 (28.0%)	19 (12.6%)	33 (22.0%)	10 (6.6%)
Total	300	82 (27.3%)	33 (11.0%)	68 (22.6%)	19 (6.3%)
Europeans	100	42	17	38	13

The results show that in West Africa the percentage of Europeans carrying coagulase-positive staphylococci in the nasopharynx and on the skin does not

differ significantly from that found in England. The percentages for Africans were, in the nose 22.6 per cent, on the skin 11.0 per cent: the percentage having coagulase-positive staphylococci both on the skin and in the nose was 6.3. Mills *et al.* (1944), working in England, found that of 479 persons 47.4 per cent had coagulase-positive staphylococci in the nose and 18.4 per cent on the skin while 11.7 per cent only had coagulase-positive staphylococci both on the skin and in the nose.

The differences observed in the rates for Europeans and Africans in West Africa are not statistically significant. It will be noted that in the case of the Africans with coagulase-positive staphylococci on the skin 19 out of 33 also had coagulase-positive staphylococci in the nose while in Europeans the corresponding figures were 13 out of 17. These figures support the theory that the nose is a source of skin staphylococci, a suggestion for which additional evidence has recently been obtained by Williams (1946). It is of interest that life largely in the open air, with daily baths and daily washing of clothes, has so little effect in decreasing the incidence of staphylococci in the nose and on the skin of Europeans, as shown by the numbers found carrying staphylococci in cold climates and in the tropics.

The incidence of coagulase-positive staphylococci in the nose in cases of pyomyositis is not without interest. In 18 cases where a coagulase-positive staphylococcus was found in the abscesses, a similar coagulase-positive coccus was isolated from the nose in 13. While further investigations are necessary, it is possible that in this condition the nasopharynx may be a portal of entry for the staphylococcus into the blood. In two cases, however, small septic abrasions on the leg were the probable portal of entry since no coagulase-positive staphylococci were found in the nasopharynx. The reasons why pyomyositis associated with staphylococci is so rare among Europeans in the tropics is unknown: only two cases have occurred in European troops in West Africa while many hundreds of African soldiers have been admitted with this curious condition.

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THE DISINFECTION OF MESS TINS IN THE FIELD.

BY

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NORTH AMERICAN literature abounds in investigations carried out on the dissemination of infection via glasses and crockery in civilian undertakings. Cumming [1], Mallmann and Devereux [3], and MacPherson [4], *et al.* have been to the fore in this field. The following report is an inquiry into the dangers of similar dissemination of infection in the Services.

It is clear that there is a theoretical danger of cross transmission of nose, throat and intestinal commensals when mess tins are washed in a common rinse. Further, there is a distinct possibility of fly-borne spread of infection in tropical and subtropical zones when mess tins are left between meals in billets. It might, therefore, be timely to inquire into such protective hygiene measures as are adopted in the Army. In some units mess tins are swilled in a single container of warm water, in others immersion for various periods in containers of hot to (?) boiling water is the practice, with possibly the addition of a hypochlorite rinse. Therefore, there appears to be a lack of uniformity in official policy in this matter. This paper is an attempt to elucidate this problem in a scientific and yet practical manner.

POTENTIAL PATHOGENS PRESENT IN FOOD DEBRIS.

A given volume (25 ml.) of sterile distilled water was first added to mess tins containing food debris. 1.0 ml. of this mixture was now pipetted on to agar plates and incubated at 37° C. for forty-eight hours. Colonies, which appeared on agar plates to show characteristics of the staphylococcus and streptococcus groups, were then subcultured on agar slopes and twenty-four hours later plated on blood agar and Dorset egg medium. Examination of 24 such colonies isolated in this way showed the following micro-organisms to be present.

Sarcinae	1
<i>C. diphtheroid</i>	1
<i>B. subtilis</i>	1
* <i>Staph. aureus</i> <i>B. hæmolytic</i>	9
* <i>Staph. aureus</i> non-hæmolytic	3
* <i>Strep. non-hæmolytic</i>	4
* <i>Strep. viridans</i> and hæmolytic	1
<i>Mic. tetragenus</i> <i>B. hæmolytic</i>	4
Total	24

* Potential pathogens.

It will be seen that 17 of the above 24 organisms are potential pathogens. The next logical step was to investigate the possibility of some of these organisms being transmitted directly from the nose or throat of the soldier to his

mess tin. After a further series of examinations carried out as described three colonies of *Micrococcus catarrhalis* were recovered from the food debris of used mess tins. According to Topley and Wilson [7]: "Those species of Gram-negative cocci which have been adequately described are found almost exclusively in the nasopharynx of healthy and diseased persons." Therefore, there would appear to be strong presumptive evidence for regarding at least some of the 17 potential pathogens as being human and not aerial in origin.

TOTAL ORGANISMS PRESENT IN MESS TINS CONTAINING FOOD DEBRIS.

The total number of organisms recoverable after a meal from the food residue of mess tins was now investigated. This was computed by adding a given volume of sterile distilled water (25 ml.) to each mess tin. Various dilutions of the resulting suspension were then inoculated on to agar plates.

A count from each of 100 mess utensils revealed an average of 730 organisms in 0.1 ml. of suspension to be present. The range varied from 19 to 1,720 organisms in 0.1 ml. Thus the mean total number of organisms recoverable from the food residue of one mess tin was 207,500. It is interesting to note that this is very different from the findings of Mallmann and Devereux [3] and MacNabb, White and Owen [2], who recovered only 17,000 and 50,000 organisms respectively per utensil.

MECHANICAL EFFECT OF A COLD WATER RINSE.

Recent editorial comment in this Journal [6] was of opinion that the mere mechanical rinsing in cold water of cups, glasses, etc., was in itself enough to substantially reduce any organisms which might be present. It was felt that this impression should be confirmed or qualified. The following investigation was undertaken with this purpose in view.

TABLE I.
Control on MacConkey agar 20,000 organisms per ml.

Mess tin No.	Temp.	Contact period of rinse	MacConkey plate count/ml.
1	17° C.	5 seconds	278
2	"	"	363
3	"	"	274
4	"	"	925
5	"	"	510
6	"	"	240
7	"	"	179
8	"	"	57
9	"	"	450
10	"	"	31
11	"	"	185
12	"	"	248

Mean number of *B. coli* recovered 303 per ml.

A suspension of *B. coli communis* was isolated from fæces and various dilutions added to nine MacConkey agar plates to give control readings.

10 ml. of this standard suspension was now added to each of 12 mess tins

containing food debris. The latter were then rinsed for five seconds¹ in sterile distilled cold water. A given volume of sterile distilled water (15 ml.) was added to each "rinsed" mess tin while the contents were swabbed with a rubber-tipped "policeman." 1.0 ml. of the contents was now plated on MacConkey agar.

Thus the mean total *B. coli* recovered from each rinsed mess tin 4,545 organisms (i.e. 303×15). As the total number of *B. coli* added to each mess tin was 200,000 organisms (i.e. $20,000 \times 10$ ml.), a simple cold water rinse will remove an average of 97.5 per cent of any contaminating bacteria.

An investigation was now conducted to determine a suitable agent for the disinfection of mess tins. Two alternative lines of approach appeared reasonable for field work.

- (1) Heat alone with brief contact period (five seconds).
- (2) A hypochlorite rinse with a contact period of similar duration.

The effect of (2) and a combination of (1) and (2) has already been adequately dealt with by Mann [5], who found that the large amount of food debris remaining in mess tins after a meal caused an extremely rapid deviation of the free chlorine present in the hypochlorite solution and the short contact period of five seconds was too limited to give effective disinfection.

EFFECT OF HEAT AS A DISINFECTING AGENT.

(a) *B. coli communis*.—A full scale trial was now conducted with 60 mess tins containing food debris after a meal. To each of these 10 ml. of *B. coli communis* suspension isolated from faeces was added, the contents being thoroughly mixed.

Technique.—One mess tin was taken as a control and made up to 25 ml. with sterile distilled water. Three MacConkey plates were put up from each of the three following dilutions of the control, 0.01 ml., 0.001 ml., 0.0001 ml. and the mean of the nine readings regarded as the control reading.

The remaining 59 mess tins were then consecutively immersed in a sterile hot water rinse at 80° C. for five seconds. After this rinse, every ninth tin was

TABLE II.

Control on MacConkey agar. 3,000,000 <i>B. coli</i> per ml.			
Mess tin No.	Temp. of rinse	Contact period of rinse	<i>B. coli</i> on MacConkey
1	80° C.	5 seconds	Nil
10	"	"	"
19	"	"	"
28	"	"	"
37	"	"	"
46	"	"	"
55	"	"	"

Rinses with an equivalent contact period in lower temperatures failed to give complete disinfection of all mess tins.

¹ Mean time taken for rinsing of each mess tin in the field.

selected for examination. To each of the non-control tins 25 ml. of sterile distilled water was added and the interior thoroughly scoured with a sterile rubber-tipped "policeman." 1.0 ml. from each non-control mess tin was then pipetted on to MacConkey agar which was then incubated at 37° C. for forty-eight hours.

(b) *Strep. hæmolyticus*.—A similar technique was now employed on suspensions of *Strep. hæmolyticus* (Lancefield Grp. A). The procedure was identical to that outlined for *B. coli* excepting that the culture medium employed was blood agar. As with *B. coli* all non-control mess tins were rinsed at 80° C. for five seconds.

TABLE III.

Control on blood agar plate, 23,800 organisms per ml.

Mess tin No.	Temp. of rinse	Contact period of rinse	Blood-agar plate count
1	80° C.	5 seconds	Nil
10	"	"	"
19	"	"	"
28	"	"	"
37	"	"	"
46	"	"	"
55	"	"	"

(c) *Staph. aureus*.—Exactly the same technique was now employed with a pure strain of *Staph. aureus* (Oxford), excepting that the culture medium employed was nutrient agar.

TABLE IV.

Control on agar plate, 17,000 organisms per ml.

Mess tin No.	Temp. of rinse	Contact period of rinse	Agar plate count
1	80° C.	5 seconds	4
10	"	"	17
19	"	"	1
28	"	"	Nil
37	"	"	"
46	"	"	"
55	"	"	2

Table IV shows clearly that a rinse at 80° C. with a five-second contact period was quite inadequate to disinfect effectively mess tins impregnated with a suspension of *Staph. aureus*. A further effort was now made to find an adequate temperature which would disinfect mess tins impregnated with a suspension of *Staph. aureus*. In this case, mess tins were immersed in boiling water maintained at 100° C. for five seconds.

The above experiment was repeated on four occasions. In each instance, two of the eight agar plates revealed the presence of colonies of *Staph. aureus* varying from 2 to 38 in number.

These findings reveal the limitations of boiling water with a brief contact period as an effective disinfecting agent.

Yet another attempt was made to find an effective rinse which would disinfect mess tins contaminated with suspensions of *Staph. aureus*. In this instance, all contaminated mess tins were immersed in two rinses each at a

TABLE V.

Control on agar plate, 36,000 organisms per ml.

Mess tin No.	Temp. of rinse	Contact period of rinse	Agar plate count
1	100° C.	5 seconds	Nil
10	"	"	"
19	"	"	7
28	"	"	Nil
37	"	"	"
46	"	"	"
55	"	"	2

temperature of 80° C. and each with a five-second contact period. Apart from this alteration, the technique employed was identical with that previously outlined.

TABLE VI.

Control on agar plate, 31,600 organisms per ml.

Mess tin No.	Temp. of each rinse	Contact period of each rinse	Agar plate count
1	80° C.	5 seconds	Nil
10	"	"	"
19	"	"	"
28	"	"	"
37	"	"	"
46	"	"	"
55	"	"	"

The above experiment was repeated five times. On only two occasions was a single colony of *Staph. aureus* recovered after the double 80° C. rinse.

SUGGESTED DRILL FOR FIELD DISINFECTION OF MESS TINS.

On completion of a meal, troops would rinse their dirty mess equipment in a non-returnable 5 gallon oil drum containing water maintained at boiling point. Such a single five-second rinse would disinfect utensils of all *B. coli* and *Strep. hæmolyticus* and the major portion of the *Staph. aureus* present.

When entering the dining hall for the subsequent meal, troops would once again rinse their mess tins in the same drum containing fresh boiling water. By this second rinse virtually all *Staph. aureus* organisms would be destroyed and any further bacterial contamination of mess tins by flies, etc., which might have occurred between meals would be effectively destroyed. An added culinary advantage is that the second rinse at 100° C. would ensure hot meals always being served in a hot container.

SUMMARY.

(1) An investigation has been conducted to determine whether potential pathogens are recoverable from used mess tins.

(2) Presumptive evidence is submitted to support the belief that the nasopharyngeal spread of infection through eating utensils is a distinct possibility.

(3) An assessment of the total organisms recoverable from the average mess tin has been made.

(4) The mechanical effect of rinsing dirty mess tins containing food debris in cold water for five seconds was found to reduce the organismal count by 97.5 per cent.

(5) The effect of hot rinses at 80° C. with five-second contact periods on *Staph. aureus*, *B. coli* and *Strep. hæmolyticus* has been investigated.

(6) Finally, a practical field method for the disinfection of organisms has been presented.

I am deeply indebted to Serjeants J. Ridley and J. Delaney, and Private J. Bannerman of the R.A.M.C. whose advice and assistance have proved invaluable in this investigation.

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QUANTITATIVE ESTIMATION IN PSYCHIATRIC DIAGNOSIS.

BY

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[Received November 23, 1946.]

ACCURATE diagnosis of psychiatric conditions has always been a difficult problem and, to meet it, various systems of nomenclature have been devised. These have been based on ætiological, symptomatological and even prognostic factors, yet, in the practice of psychiatry in the Army, none of the systems in current use have been particularly satisfactory and the task of fitting things into the official nomenclature of disease has been very difficult indeed. Very often one meets conditions which do not conform to the nomenclature and yet have to be pigeon-holed into it. This meant that the label given to a disease in many instances bore very little resemblance to the disease it was to indicate. The reasons why this should be so are probably numerous, but there is one which forcibly suggests itself and that is, we are trying to make use of a nomenclature which has become out-dated. Prior to the introduction of Kraepelinian nosology, there was chaos out of which he created some sort of order and it was something that psychiatrists of his day understood. They were able to give a fairly accurate description of those cases which came under their care, such as patients in civilian mental hospitals. Unfortunately, we have still to use the labels of Kraepelin for the various forms of psychiatric breakdown one meets in the Army.

Adolf Meyer then introduced a new term—"the reaction type"—and while this was a most useful aid in the understanding of the nature of mental illness, it did not indicate the quantitative element. The saying has been attributed to Kretchmer: "It is not enough to say that a man is suffering from Manic-Depressive Psychosis, or Schizophrenia, but we should also indicate how much of each is present." This is reminiscent of our house-surgeon days, when we told the "chief" that a patient had appendicitis and he would say, "That is not enough; I want to know what kind of appendicitis and the position of the appendix." Surgical nomenclature has kept pace with these demands. The quantity factor in psychiatry is just as important, yet our present system makes a very half-hearted effort to deal with the problem.

In order to regard all mental illness in the Meyerian light of a reaction of the total individual, some basic knowledge of the personality must exist. The most accepted classification of personality is that of Jung—the introvert and the extrovert—but these types are seldom "pure"; in fact, they are mostly

mixed. If the population were graded according to their personality types, we should get the usual biological curve, with by far the largest grouping in the centre, consisting of personalities with a fairly intimate mixture of introvert and extrovert. If personality can play an important part in the genesis of mental disease (and many believe it does) then the extreme introverts and extreme extroverts seem to be good candidates and their illnesses would assume a "pure" form—the classical case one sees in the civilian mental hospital and adequately catered for by Kraepelin. But the mixed mass in the centre are also liable to attacks of mental illness, especially under the stresses of military service and all that entails. Is it reasonable to assume that their symptomatology would be mixed? Mixed symptomatology is frequently met in Service psychiatric casualties and these cases are drawn from the large middle group—the average recruit.

The mixed case has given the Service psychiatrist much food for thought and much anxiety as to the finding of a suitable label. Various "dodges" have been resorted to; such as "Schizoid type", "with depressive features," the word "predominantly," or even an honest N.Y.D. To add to the confusion, there has often been found an overlap between neurotic and psychotic symptoms, although this has been mainly between the anxiety states and manic-depressive psychosis and between hysteria and schizophrenia [1].

Again, the presentation of these mixed symptoms was not always constant. The clinical picture would vary, sometimes from week to week, in the same case, and the A.F.I. 1220 adequately demonstrated the doubt in the mind of the psychiatrist. Very often, prior to the patient's discharge from hospital, a new A.F.I. 1220 was made out to remove the evidence of the fluctuation of the patient's mental state! As most of my time was spent in busy Military Psychiatric Hospitals, mainly overseas, the "mixed symptomatology problem" presented itself most insistently and a more accurate form of labelling was considered essential, if only for one's own peace of mind.

Quantitative factors in medicine are still expressed in adjectives, e.g. mild, moderate, severe. Even in the laboratory numerals are not always used and +++ is still used for 3. It was decided to use numbers to describe the quantitative element in psychiatric diagnosis and thus try and give a more accurate picture of a soldier's mental state. The difficulties raised by such an experiment are almost overwhelming and many have still to be solved, but a working arrangement can be arrived at. What had to be decided on first was (a) whether Kraepelinian nosology was worth retaining, and (b) whether a more accurate form of labelling could be built up from it.

Kraepelin described the "classical" cases, therefore it was considered possible to modify his labels with numbers, so that they would describe the ordinary mental reactions one meets in Service psychiatry. The next problem one is faced with is to arrive at the number of divisions a mental illness can be split into and each division still be clearly distinguished by the clinical mind. This number was arrived at by trial and error. At first it was considered, and probably rightly so, that the more quantitative divisions, the more accurate the diagnostic label, but it was soon found that any number above 6 led to a

false degree of accuracy which was often beyond clinical assessment. Each case was then described by a fraction as follows :—

$$\text{e.g. :— } \frac{\text{Manic-Depressive Psychosis } 5}{\text{Schizophrenia } 3}$$

But, as has already been stated, the patient's mental state often fluctuated and an attempt was made to cater for this fluctuation by using three numbers on each line : the first to indicate the maximum amount, the third the minimum, and the second the clinical mean of the case—this number to be written larger than the others or printed in heavy type. This "vignette" should then be flanked on either side with the period of observation and letters used for the dominant clinical features such as D for depression, S for schizophrenia. The vignette would read as follows :—

$$15.8.44 \quad \frac{D \ 5 \ 4 \ 2}{S \ 3 \ 2 \ 1} \quad 20.10.44$$

An interpretation of this formula would be : The patient came under care on 15.8.44 and was discharged on 20.10.44. During this time the clinical picture was a mixed one, the depressive element being the dominant one and at one time it was almost a pure depressive psychosis. Schizophrenic features were however always present, at one time quite markedly, but on the whole not to the same degree as the depressive features.

As so often happens in cases occurring overseas, there is a complicating organic or toxic element such as malaria, dysentery, sandfly fever, vitamin deficiency, or even head injury. This could be added to the vignette with the letter O, and a formula could read thus :—

$$15.8.44 \quad \frac{D \ 5 \ 4 \ 2 \cdot O \ 3}{S \ 3 \ 2 \ 1} \quad (\text{bac. dysentery}) \quad 20.10.44$$

If, as is so often the case, there are no facilities for long-term supervision, a simple fraction such as that first given with the date of examination is quite sufficient to indicate the degree of the mixed nature of the case. This method repeated at each examination and dated is a good guide to the progress of a case through the various channels of evacuation.

Here are two cases to illustrate its use:—

(a) L/Cpl. R. P. aged 25. Service four years.

On 26.2.46 he was admitted to hospital complaining of pains in the head and insomnia since his return from L.I.A.P. two months previously. He then admitted that God spoke to him and that he had taken to the Bible but was generally reticent about his religious thoughts. He was diagnosed as a case of schizophrenia. On 3.3.46 it was noted that "he sits in a chair clasping the Bible between his hands and talks in a depressed tone of voice saying that it was God's influence he was alive to-day."

19.3.46 : Confused and disorientated and appeared to have auditory hallucinations and was emotionally blunted. He insisted he could cure bad eyesight by means of his spittle, but was too confused to elaborate.

6.5.46 : Very little change and was started on course of Electrical Convulsions (E.C.T.). Began to improve but was always sullen, solitary and difficult of access and at times offensive and argumentative.

17.7.46 : Has been very violent and had to have repeated doses of sedatives. Vividly hallucinated and completely lacking in insight. Regarded as a case of paranoid schizophrenia.

12.8.46 : Became morbidly depressed. Full of ideas of guilt and sin and preoccupied with suicidal thoughts. Started on second course of E.C.T.

13.9.46 : Has responded well—Cheerful and co-operative. Conduct reliable and working well in open ward. At times rather facile but personality is reasonably well integrated.

Suggested vignette :—

26.2.46 D 6 4 1 15.9.46
 S 5 2 0

(b) L.A.C. D. F., aged 24. Service six years.

Family History.—One brother who was P.O.W. for five years was admitted on repatriation to Carstairs Military Hospital suffering from a psychosis. He recovered after a course of E.C.T. and was discharged after three months. No other neuropathic heredity elicited.

Personal History.—Was always bright and cheerful and fond of sports.

History of Present Illness.—17.1.46 : While on troopship on return from L.I.A.P. he reported sick to M.O. with the complaint that he was worried about his masturbatory habit which failed to give him any sexual satisfaction. He was tearful, extremely anxious and believed his companions were annoying him.

18.1.46 : Said people were always looking at him.

21.1.46 : Deteriorating. Impulsive and violent. Resistive and trying to escape. Regarded as suicidal.

20.3.46 : On admission : Mute and stuporose and very depressed looking. Takes food satisfactorily but incontinent of urine. Following visit of mother 23.3.46 he became emotional, agitated and restless and expressed depressive thoughts : " Why don't you cut me up and experiment on me—I'm ready to die."

8.4.46 : On examination : He talks a little but is essentially uncommunicative. Shrugs his shoulders with an air of hopelessness and asked " Are you suffering because of me ? " He would not elaborate. Psychomotor retardation is evident, but there is no indication that he is hallucinated. Started course of E.C.T.

12.5.46 : Bright and cheerful. Plays football—conduct is reliable. E.C.T. discontinued.

20.5.46 : Beginning to relapse. Facile and childish. Tends to wander off and make inconsequent remarks to the N.A.A.F.I. girls. Confused—" There's something funny going on." Probably hallucinated. The clinical picture is now a schizophrenic one.

Suggested vignette :—

17.1.46 D 5 3 1 20.5.46
 S 5 3 1

DISCUSSION.

It is true that the basis of these vignettes is mainly speculation, but then, so is that of most of psychiatric nomenclature. The factorial aids are not in the least comprehensive, but it has been found that a vignette with dates very often gave a more reliable picture of a man's mental state and progress than could be gauged from an ordinary psychiatric report and was also more accurate than the nomenclature in use. No attempt has yet been made to deal with the neuroses in this way but these too lend themselves to the above method. The continued use of these fractions can be most helpful from the prognostic angle, e.g. a loading of schizophrenic deterioration which increases with the duration of the illness would be unfavourable. Various other factors can be dealt with in this way, such as Paranoid Colouring, Dys-symbole, Dyskinesia [2] but an assessment of their part in the basis of personality would be necessary first. The possibilities of its development in psychiatric diagnosis

are almost overwhelming and its use would have to be restricted to prevent it becoming too complicated and thus adding to the confusion at present existing.

SUMMARY.

(1) An attempt has been made to aid the quantitative estimation of psychiatric disorders.

(2) A vignette has been described which incorporates much of the information contained in psychiatric reports.

(3) In Service psychiatry it would ensure a continuance of a uniform type of assessment throughout the whole of a patient's time spent under psychiatric care.

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PNEUMONIA PROPHYLAXIS IN NATIVES OF EAST AFRICA.

BY

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[Received November 10, 1946.]

THE following is a report showing the effect of inoculation against pneumonia in native troops in East Africa.

The camp was situated on the Athi plains a few miles from Nairobi in Kenya, height above sea-level six thousand feet. Africans were here trained in the use of motor transport, and taught how to drive. There were seven thousand five hundred native troops and the average age was 20 years. They came from the native quarters of Kenya, Uganda and Tanganyika. The experiment took place between September, 1942, and January, 1943.

The incidence of pneumonia was high. It was noted that during the months of July and August, 1942, the average number of cases weekly was 70.5, and it was decided that special measures should be adopted.

A few special factors were considered as the cause for this high incidence.

There are marked temperature variations in this area particularly noticed as a rise in temperature two or three hours after sunrise, and also a rapid fall at sundown. A large number of the troops were enlisted from lower and coastal regions and they were affected by the cold nights.

The East African male is generally used to a lazy way of life, this was of course altered. In a training camp, discipline is strict and hours are long.

Sleeping quarters were checked so that the regulation floor space was allotted per head and all troops were ordered to sleep head to foot alternately. Nevertheless during demonstrations, lectures, sick parades, as well as in the evenings after duty hours, large numbers herded together. This must have been an important factor in the spreading of the pneumococcus by droplets.

Some general measures were first adopted with regard to clothing and diet. Each recruit was issued with two blankets G.S. (General Service) or one blanket G.S. and two cotton. A greatcoat was a general issue as well as a long sleeve jersey.

Ghi forms a part of the African's daily ration. (It is the main fat ration and is a palm extract.) Whenever possible a synthetic ghi substitute was used instead of ghi, on account of its higher vitamin "A" (protective) content.

It was considered that conditions were satisfactory to attempt an experiment to assess the effect of preventive inoculation. This could be performed on a large scale and then the incidence of pneumonia among the protected and unprotected personnel compared.

The Anti-Pneumonia Vaccine was prepared by "The Medical Research Laboratory, Kenya." This was made up containing 1,000 million organisms each of types I, II, III, V, VII, VIII, XIV, and XV, in each c.c. These eight types were chosen as the commonest to affect the African.

Altogether 2,330 recruits were inoculated. The first batch was of 330 ; they received 1.0 c.c. of vaccine and a further 1.0 c.c. after seven days. After perusal of the results it was considered that this dosage was too large.

The second batch was of 1,000 recruits and the dosage was 0.4 c.c. and then 0.6 c.c. after seven days. The third batch was of 1,000 recruits with the same dosage and time interval.

The average daily strength of Africans in camp was 7,540. A control was established by a comparison of the incidence amongst the inoculated and the remainder.

Special discs were stamped, similar to ordinary Service identity discs. The marking was " Anti-Pneum Vacc " and dated. These were worn around the neck with the identity disc. They proved to be a great help in the rapid check on subsequent cases of pneumonia to differentiate between inoculated and controls. Loss of the disc subjected the man concerned to a charge. Punishment was severe and usually to the extent of seven days' stoppage of pay. This meant a heavy fine to a recruit who is paid 28 shillings a month.

A careful watch had to be made on each batch as inoculated. Most Africans have great faith in an injection. I had observed during previous routine inoculations that a number of men immediately after inoculation would join on the end of the line of those still waiting, so as presumably to obtain a little extra of the desired medicine.

The figures accepted were all frank cases of pneumonia, with pyrexia, blood-stained sputum and positive clinical signs. Other facilities for proving the diagnosis were not available.

Evidence could only be obtained during the periods as shown, as batches of recruits were posted away after about two and a half months of training, and these men were sent to active theatres of war where further observations would have been difficult.

TABLES.

First Batch

330 recruits	..	1 c.c. vaccine 10.9.42,
		1 c.c. vaccine 17.9.42

Average daily ration strength 7,540. This leaves 7,210 unprotected.

Second Batch

1,000 recruits	..	0.4 c.c. vaccine 10.11.42
		0.6 c.c. vaccine 17.11.42

Average daily ration strength as before 7,540. This leaves 6,210 unprotected, but after December 5 the first batch was posted away.

Third Batch

Same as second	..	0.4 c.c. vaccine 10.12.42
		0.6 c.c. vaccine 17.12.42

From this date there were 2,000 protected and 5,540 unprotected. Cases occurring amongst different batches were determined by noting the dates on the stamped discs worn around their necks.

The number of cases of pneumonia occurring weekly per 1,000 were worked out for each batch of protected and unprotected.

			FIRST BATCH.	
			No. of cases per 1,000	No. of cases per 1,000
Week ending 1942			protected	unprotected
Sept. 19	..	..	15.2	4.9
Sept. 26	..	..	6.1	6.8
Oct. 3	..	..	15.2	5.5
Oct. 10	..	..	6.1	5.8
Oct. 17	..	..	Nil	5.9
Oct. 24	..	..	6.1	6.0
Oct. 31	..	..	3.0	7.8
Nov. 7	..	..	3.0	5.7
Nov. 14	..	..	3.0	9.0
Nov. 21	..	..	Nil	2.9
Nov. 28	..	..	Nil	6.0
Dec. 5	..	..	Nil	2.4

			SECOND BATCH	
			No. of cases per 1,000	No. of cases per 1,000
Week ending 1942-3			protected	unprotected
Nov. 14	..	..	3.0	9.0
Nov. 21	..	..	3.0	2.9
Nov. 28	..	..	1.0	6.0
Dec. 5	..	..	4.0	2.4
Dec. 12	..	..	3.0	2.7
Dec. 19	..	..	1.0	2.7
Dec. 26	..	..	Nil	2.7
Jan. 2	..	..	1.0	4.7

			THIRD BATCH.	
			No. of cases per 1,000	No. of cases per 1,000
Week ending 1942-3			protected	unprotected
Dec. 14	..	..	3.0	2.7
Dec. 26	..	..	4.0	2.7
Jan. 2	..	..	5.0	4.7

Third is inconclusive

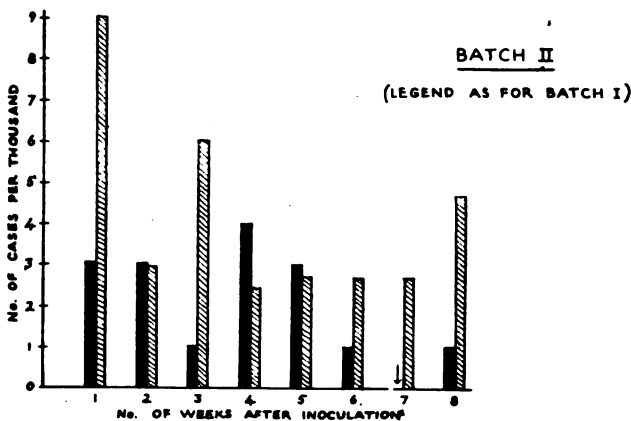
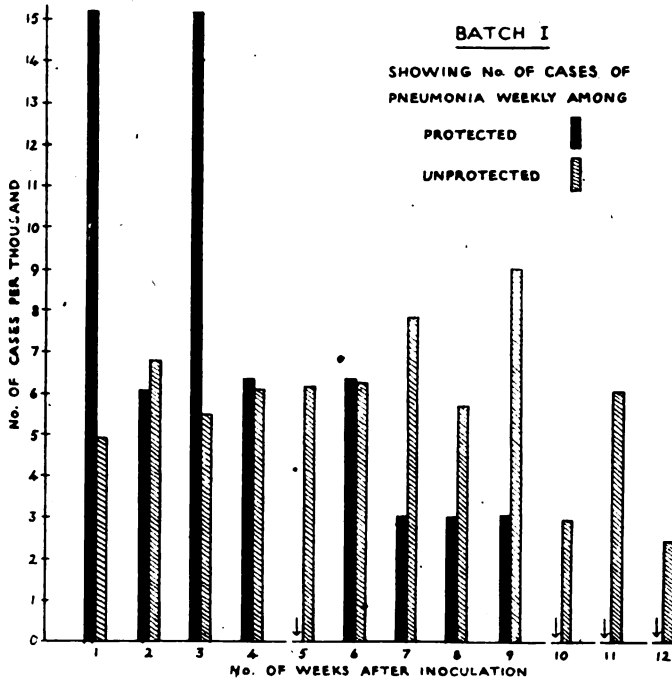
OBSERVATIONS AND DISCUSSION.

(a) The recruits carried on with their duties as usual after inoculation. Reactions were very few and very mild. Less than one per cent. reported sick. A mild pyrexia, headache and malaise being the common type of reaction.

(b) In the first batch during the four weeks following the two inoculations there was an average increase in the incidence of pneumonia among those protected. The average number of cases per thousand was 10.55 for protected and 5.75 for the unprotected, during this four-week period.

The number of cases was markedly reduced after this period amongst the inoculated. During the tenth, eleventh and twelfth weeks after inoculation no cases occurred amongst this batch. The first batch was the most valuable

for observing the effect over any appreciable period. A period of twelve weeks was noted. The inoculated were shown to be more prone to infection during the period of four weeks following the injections. This was considered as due to a negative phase during which immunity is being developed and resistance to the infection is appreciably reduced.



The dosage was reduced to prevent a too marked negative phase. The second and third batches were given 0.4 and 0.6 c.c. with the same interval of seven days between the injections.

With batch two, there was again a slightly higher incidence noticed after

the second, third and fifth weeks, and thereafter a pronounced fall. Unfortunately the second batch was posted away eight weeks after the injections, and no further results could be kept.

The third batch was not continued long enough for definite conclusions to be formed.

(c) It is particularly regretted that greater detail could not be obtained, such as the titre of antibody in the circulation, and sputum tests in each case. Facilities in the camp were very poor and the staff were very few. Our hands were full with many problems at the same time.

SUMMARY AND CONCLUSIONS.

Pneumonia had been observed to be very prevalent amongst black troops in a training camp in East Africa. During a bad period over seventy cases occurred weekly. A large number were inoculated with a mixed anti-pneumonia vaccine. The experiment was carried out under difficult conditions in the East African Command. The vaccine was made up from the eight commonest types of pneumococci known to affect the native of East Africa. Each 1 c.c. contained 1,000 million organisms each of types I, II, III, V, VII, VIII, XIV and XV. A comparison was kept of the incidence of pneumonia between protected and unprotected and a table and histogram showing the results are shown. There appeared to be a pronounced negative phase especially in the first batch, where three hundred and thirty recruits were each protected with 2.0 c.c. of the vaccine divided into two equal doses with seven days' interval. The next batch was of one thousand protected with 0.4 and 0.6 c.c. respectively with seven days' interval between.

After this negative phase there was a marked fall in the incidence of pneumonia among the inoculated. This was particularly observed with the first batch and also with the second batch of one thousand. Owing to the exigencies of the Service the observations were not continued. The first batch was observed up to twelve weeks after inoculation and the second up to eight weeks.

A third batch similar to the second was observed only for three weeks. This period was insufficient for any satisfactory conclusions to be formed.

Clinical and Other Notes.

WARTIME ADVANCES IN MEDICINE WHICH MIGHT BE TRANSLATED INTO CIVIL PRACTICE.

BY

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Extracts from a Honyman Gillespie Lecture—" Wartime advances in Medicine which might be translated into Civil Practice"—delivered in the Royal Infirmary, Edinburgh, on June 13, 1946, by Major-General Sir Alexander Biggam, K.B.E., C.B., M.D., F.R.C.P.E. (Hon.), F.R.C.P., D.T.M.&H., K.H.P. Reprinted by courtesy of the *Edinburgh Medical Journal*.

MALARIA.

At the beginning of this war malaria was our greatest problem in most of the overseas theatres of war. In Burma it was the cause of nearly half of all the total sickness and in the season of highest incidence it was responsible for 80 per cent of all admissions to hospital. Fortunately, great advances have been made in the methods of personal protection against this disease—methods that are applicable even when troops are situated in areas where permanent anti-mosquito measures cannot be carried out; malaria is thus open to attack at many points. Mosquitoes—adults as well as larvæ—can be destroyed by D.D.T., biting can be prevented by the wearing of protective clothing and the use of repellents (D.M.P.), and finally, even when men are bitten by infected mosquitoes, the disease can be kept from causing clinical symptoms by the use of suppressive mepacrine (atebrin). When Java was lost and we had to find a substitute for quinine against malaria, mepacrine was the drug selected for this purpose. At that time (1942) our knowledge of the best way of using mepacrine against malaria was very incomplete, and an enormous amount of field, laboratory, and clinical research had to be undertaken before we learned all that we now know about suppressive mepacrine.

To enable these researches to be carried out in this country volunteers came forward; these volunteers included members of the Friends Ambulance Unit, students at Oxford University where the Army Malaria Research Unit was located, and serving soldiers for the work at the Royal Army Medical College. They took varying doses of mepacrine over prolonged periods in order that we might observe the effect of the drug on their health, study its behaviour in the body, and learn more about its action on malaria parasites. Innumerable observations on blood levels were made; tests were carried out on the functions of the liver and other organs of those who had been on the drug for long periods in order to determine whether any ill-effects were being produced; and many volunteers submitted to infection with subtertian (*P. falciparus*) malaria so that accurate information could be obtained about

the best method of using mepacrine. It was found that the best all-round method of suppressing malaria was the regular, daily administration of 0.1 gm. of mepacrine given under strict supervision and continued for as long as the person was under the risk of infection and for one month after he left the malarious area. When this procedure is properly carried out, the results are beyond question. It may be said, for all practical purposes, that clinical attacks of malaria cease to occur. Moreover, if the continuation course is kept up for one month afterwards, those who have been infected with subtertian malaria will be cured—their dangerous infection will not relapse. On the other hand, attacks of benign tertian (*P. vivax*) malaria will still occur after the drug is stopped, and these attacks have to be treated on the usual lines. The employment of suppressive mepacrine in highly malarious regions has been the greatest single factor in maintaining our forces in these areas in a condition fit to fight and defeat the enemy.

Besides more effectively suppressing malaria, mepacrine has the additional advantage over quinine that it does not precipitate blackwater fever; in fact, since quinine has been given up, this much dreaded and dangerous complication has almost entirely disappeared from areas which were formerly notorious for its presence. Furthermore, those who take suppressive mepacrine regularly do not develop the severe cerebral and other complications which were so often a cause of death in pre-mepacrine days.

Much has been done to discover the best method of bringing about a radical cure of B.T. malaria (*P. vivax*). Massive doses of mepacrine have not given the results that some expected. Observations on the relapse rates of a carefully followed-up series of cases of relapsing B.T. malaria treated in this country indicate that combined treatment with quinine and pamaquin (plasmoquin), grains 30 of quinine and 0.03 gm. of pamaquin given daily for ten days, secures by a long way the greatest number of radical cures. Patients on this treatment must, however, be under medical observation during the whole period, so that the pamaquin can be discontinued if signs of toxicity appear. Hæmoglobinuria has occurred in a few patients taking pamaquin, but this has not been a source of trouble in British patients. In Indians, however, the occurrence has not been infrequent and for this reason if administered the daily dose should be reduced to 0.02 gm.

A new compound SN 13276, closely allied to pamaquin, has been produced in the United States; this is said to be a less toxic drug than pamaquin but to have all the anti-malarial properties of the old drug. If this proves to be correct and we can safely give it in larger doses, then it should prove a valuable preparation for the eradication of relapsing B.T. malaria.

While the patient is still residing in a malarious area, treatment of a clinical attack of uncomplicated malaria is nowadays usually carried out with mepacrine alone. During the first two days of treatment, relatively large doses are given to secure a rapid concentration of drug in the blood and tissues, and this is maintained by a smaller daily dose during the remainder of the treatment. A total of 0.6 to 0.8 gm. of mepacrine is a suitable daily dose for an adult on the first two days, and a daily maintenance dose of 0.3 gm. is usually

given for a further five days. Suppressive mepacrine treatment should then be commenced as soon as this treatment has been completed.

If after leaving a malarious area a patient develops frequent relapses, it is advisable to give him ten or fourteen days' quinine and pamaquin treatment to obtain a radical cure.

Major J. Innes, who until recently was in charge of No. 2 Malaria Research Team, has carried out some valuable research in malaria, first in the Central Mediterranean Force and later in this country. He has shown that any course of treatment for B.T. malaria containing pamaquin will give a lower relapse rate than treatment without pamaquin. His results indicate that intermittent quinine and pamaquin treatment of relapsing B.T. malaria given over a period of thirty-one days is likely to give the best results of all. On this treatment they received initially seven days of quinine (grains 10) and pamaquin (0.01 gm.) given t.i.d. and then after a rest from drugs for seven days two further five-day courses of dosage with another interval of seven days between these courses. The total quinine given was 510 grains and pamaquin 0.51 gm., and so far no relapses have been reported. This course is less liable to cause toxic manifestation than the continuous dosage.

Intramuscular mepacrine given in doses of 0.2 to 0.4 gm. is extremely valuable for producing a very rapid concentration of mepacrine in the blood where this is required.

A NEW ANTI-MALARIAL DRUG.

A new synthetic anti-malarial drug marketed by the British firm, Imperial Chemical Industries, may be expected to play an important part in the prevention and treatment of malaria.

Mode of Action.—Paludrine acts on the asexual parasites of the human cycle, apparently by inhibiting nuclear division. It has no detectable effect on the morphology of gametocytes in human blood, but if mosquitoes are fed on a human gametocyte-carrier while he is taking paludrine, the mosquitoes do not become infected. Oocyst formation fails in the mosquito, possibly because of some action of the paludrine in its stomach.

Perhaps even more important is the action of paludrine during the pre-patent phase of human malaria—the incubation period of ten days or so between the injection of sporozoites and the appearance of clinical symptoms and ring forms in the peripheral blood. At Cairns in Australia, Hamilton Fairley has shown that if 100 mg. (0.1 gm.) is given twice a week during this period, sporozoite-infected volunteers, bitten repeatedly by infected mosquitoes, fail to develop parasites in their blood. This observation rests on the stringent test of sub-inoculation of 200 c.c. of blood into a second group of susceptible volunteers.

In subtertian malaria (*P. falciparum*), attacks of the disease do not follow when paludrine is stopped, the drug acting apparently as a true causal prophylactic. A single dose of 50 mg. during the pre-patent phase has produced the same effect. In benign tertian (*P. vivax*) malaria, on the other hand, 100

mg. of paludrine daily acted only as a suppressive because overt attacks followed cessation of treatment, although after a longer interval than with mepacrine given in the same way.

Therapeutic Use.—For treatment of clinical attacks the optimum dosage is not yet known. As much as 1 gm. daily has been given, but 250 mg. twice daily for seven to fourteen days will probably be sufficient. This should cure patients with subtertian (*P. falciparum*) malaria; but treatment of benign tertian (*P. vivax*) relapses with paludrine has not given such good results as the ten- to fourteen-day quinine-pamaquin course.

Side Effects.—The drug is pleasant to take and it does not stain the skin. Undesirable effects are slight except with very large doses. Minor effects are vomiting and epigastric discomfort. With large doses evidence of renal irritation may appear: red blood cells and hyaline and granular casts in the urine.

DYSENTERY.

(1) *Bacillary Dysentery.*—Under primitive conditions of hygiene, bacillary dysentery is very likely to become prevalent. Such a state of affairs is often inevitable for an army living under active service conditions, and this form of dysentery has therefore been responsible for much loss of man-power in the Services, especially in tropical or sub-tropical areas.

In the early days of the recent war, the dysentery rate was high and many patients suffered from extremely severe infection which ended fatally in some instances. The Middle East Forces turned to the sulphonamide drugs for the treatment of this disease with very promising results. The preparation which the British Army has largely used is sulphaguanidine; the United States forces, however, prefer sulphadiazine and claim that the results with this drug are superior to those with sulphaguanidine. There is evidence to support the view that almost any of the sulphonamide preparations are of value in the treatment of bacillary dysentery; but if the patient is dehydrated, especially if he is in a tropical country where much fluid is lost by sweating, then as a safeguard against kidney damage sulphaguanidine is the preparation of choice. Owing to the absence of urinary complications during the administration of sulphamezathine this preparation should be a valuable one for use in bacillary dysentery. Shortage of supply, however, did not permit of its wide use in this disease during the war years. Phthalyl sulphathiazole, owing to its powerful action against bowel organisms, should also be a useful preparation.

To ensure the best results, it is important to begin treatment at the earliest possible moment. The Army, therefore, felt justified in recommending that any acute diarrhoea should be treated with sulphaguanidine without waiting for laboratory confirmation. Since this policy has been adopted, really severe attacks of bacillary dysentery have seldom been encountered, and the results of treatment with sulphaguanidine have been very satisfactory. In forward areas sulphaguanidine was issued to small detached parties of men so that they could carry out treatment themselves. The usual dose is 5 gm. every three hours for the first twenty-four hours; thereafter the dose is reduced and the interval lengthened according to the patient's response. As a rule, a total

dosage of about 100 gm. is adequate for the treatment of a patient with bacillary dysentery. In isolated communities this method of treating bacillary dysentery is of great value because the patient can be treated locally and long and difficult journeys thus avoided. Anti-dysenteric serum is now very rarely required in the treatment of patients suffering from bacillary dysentery. Reports from United States Army sources suggest the value of giving sulphonamide as a prophylactic at the commencement of an outbreak of bacillary dysentery in a unit to prevent the spread of the disease.

Bacteriophage Treatment.—It was shown by Boyd and Portnoy in the Middle East Force that this form of treatment was of no value. Conversations with captured German medical officers revealed that they had reached the same conclusions.

The value of D.D.T. in the control of flies and the spread of dysentery has been mentioned under insecticides. The absence of flies where D.D.T. residual spray has been properly applied to the right places is very striking. It should be remembered, however, that in practice D.D.T. is only effective against the adult fly; once the egg has been laid it will not prevent the further development up to pupation.

(2) *Amœbic Dysentery.*—Large numbers of our troops have had to operate in countries where amœbic dysentery is prevalent. As a result much experience has been gained in the treatment of this disease. Many patients evacuated from overseas have arrived in this country with a very intractable form of amœbic dysentery which had resisted all the usual methods of treatment. It seemed a fair assumption that invasion of the damaged intestinal walls by secondary pyogenic organisms might play an important part in these intractable cases that are unresponsive to ordinary combined courses of treatment with emetine, emetine bismuth iodide (E.B.I.) and chiniofon. Therefore an attempt was made to deal with these organisms by a preliminary course of penicillin and sulphonamide.

W. H. Hargreaves has shown that such a preliminary course may bring about conditions that permit a favourable response to emetine therapy in patients who have previously resisted all ordinary forms of treatment and have progressively deteriorated into a poor state both physically and mentally. The course to eliminate secondary pyogenic organisms which has been found to give the best results is as follows: give 30,000 units intramuscularly every three hours until 2,000,000 units have been administered. At the same time give sulphasuxidine 20 gm. or phthalyl sulphathiazole 10 gm. daily for the same period. If necessary, sulphadiazine, sulphathiazole, or sulphaguanidine may be used in appropriate dosage. This preliminary course does not eradicate the specific (amœbic) infection but it certainly paves the way for cure by one of the ordinary anti-amœbic courses. Accordingly, the usual course of oral E.B.I., chiniofon retention enemas, or diodoquin, and the follow-up course of stovarsol or carbarsone is begun as soon as the preliminary course of penicillin and sulphonamide has been completed. It is essential to ensure that E.B.I. is given in a readily absorbable form, preferably in a gelatine

coated capsule. This great advance in the treatment of resistant cases of amoebic dysentery has changed the whole outlook for patients whose infection had previously resisted all attempts at cure.

TREATMENT OF INTRACTABLE CASES OF AMOEBIC DYSENTERY THAT RESIST ORDINARY TREATMENT.

Day 1-8. Penicillin 30,000 units intramuscularly every three hours for eight days combined with sulphasuxidine 20 gm. daily for the same period; or phthalyl sulphathiazole 10 gm. instead of sulphasuxidine.

Day 9-21. Emetine bismuth iodide grains 3 given in a readily absorbable form by mouth on an empty stomach each night, together with chiniofonum (yatren) retention enema 2½ per cent or 4 per cent each morning, 250 c.c. to be retained for eight hours.

Day 9-29. In lieu of chiniofonum retention enema a twenty days' course of diodoquin may be given by mouth consisting of 3 pills (each contain 0.2 gm.) three times a day for a total of twenty days, this ending on the twenty-ninth day of treatment.

Day 21-33. Stovarsol or carbarsone tablets (0.25 gm.) one twice a day for twelve days.

The patient may be allowed out of bed after the twenty-first day of treatment and can complete his course at a convalescent home or depot.

Tests of cure are not commenced until one month after completing the treatment when specimens should be examined daily for six consecutive days; three months later a similar clearance test should be performed.

TRIAL DEMAND "X."

BY

Major HARRY POZNER, M.C.,

Royal Army Medical Corps.

[Received November 11, 1946.]

FOR my own part, I don't want this story to die. Mainly because it reminds me of those fantastic days when I was associated, even if remotely, with the hindmost of the back-room boys and because it keeps green the memory of a good soldier, Pete the Paramule.

Pete's story lives in dry and stilted phraseology in official reports, and his photograph hangs in a certain little-known Officers' Mess in Northern India. Yet his saga is bound up with those early stirring days of Wingate's Raiders when the Chindits, taking the long-awaited offensive in Burma, savagely bit huge chunks out of the Japanese lines of communication. What he did left little mark on the actual outcome of events but, as he browses contentedly in some sun-washed compound on the Plains, he can remember with pride that he was the pioneer of what may well have been a new and decisive departure in jungle warfare.

In the thick dah- and kukri-resistant tropical undergrowth which was the guerilla's playground even the ubiquitous Jeep had to give precedence to the mule as the only reliable means of transport, and often on the surefootedness and stamina of these pack animals the survival of the jungle-penetration groups depended. But the mules were equally as vulnerable as humans to bullets and

disease, and as their numbers diminished so the task forces in which they were incorporated became less mobile until finally the problem of animal replacement became one of pressing necessity.

The Air Despatch companies operating from airfields on the Assam-Burma frontier had supplied by parachute everything from monacles to "Men Only," and from chewing gum to chillis, to the columns which had crossed over the Chindwin, and it was only a logical if perhaps longer step in reasoning to suppose that mule reinforcements could be dropped in the same way. The original idea germinated in the bizarre Arabian Nights atmosphere of New Delhi where anything could, and did, happen—on paper. It captured the whimsical bureaucratic imagination and, gathering impetus as it drifted from Directorate to Directorate, eventually emerged as a highly confidential and much be-taped directif in the form of Trial Demand "X." From then on the whole project was in the hands of that mysterious organization known to the initiates of South East Asia Command as "The Fortress of Science," "The Royal Corps of Majors," the "Heath Robinson Home," or just simply as "The Bughouse." It would take, and has taken, many volumes to describe the multiple activities of this inter-Service institution, but it is sufficient to say that the suggestion of a parachuting mule was novel enough to be seized upon with alacrity and enthusiasm by the geniuses of the Forgotten Army.

At first the technical difficulties appeared to be overwhelming but, fortunately, the S.T.O. of the R.A.F. Element, who was never happier than when faced with an apparently insoluble problem immersed himself in the deep contemplation of a slide rule, statistics and a model fuselage to the exclusion of all the considerable temptations of the Mess Bar and the Club houris. All the Services were co-opted. The R.I.A.S.C. supplied the mules who were looked after by the vets., who, in turn, as they became the victims of nervous prostration, were looked after by the doctors. Sappers and R.A.F. technicians considered the matters of stress and strain, parachute fabrics, landing pontoons and fuselage modifications.

After many designs for a mule parachute platform had been submitted, considered and rejected, a prototype was finally approved.

This was a small, well-constructed wooden platform on to which the mule was to be strapped lying on its side on a mattress of shock-absorbing air cushions. The platform and its load were to be ejected from the aircraft through a specially enlarged aperture in the fuselage by a device which had already proved itself invaluable in large-scale supply-dropping operations. Two clusters of large gaily coloured statichutes were attached to the pontoon in such a way that it would drift gently and horizontally to the ground.

At last came the first dropping test using a dummy mule of standard weight. The dropping zone itself was a carefully selected site in the arid Northern plains, far from any village, remote from observation except that of an occasional cow-herd who would have been surprised had he known the excitement that filled the four occupants of a Jeep parked by the side of a mound of stones. The plane from the Experimental Flight banked in the shadow of the snow-capped mountains and glided down gracefully on to its

dropping run, disgorging as it approached the T cloth a large cylindrical bundle which tumbled slowly over and over in the clear air.

The parachutes had fluttered out in long cigarette-shaped streamers, all failing to open except one, which, tattered and ripped, plommeted despondently down above the dummy mule, a loud crash, the sharp crack of bursting air-bags, and a rain of wooden splinters marked the end of the first trial. The die-hards of the Veterinary Corps sympathized with smug virtue and a "I told you so" look in their eyes, but the research team was not to be deterred so easily. A few parachute adjustments and modifications were made, and since time was becoming short it was decided to proceed with the first pukka trial as soon as there was a reasonable chance of success. The paramount



Mule being released from pontoon after first 100% parachute drop, February, 1945
(Author in beret and paratroop jacket).

problem was to find a suitable mule. The vets. were extremely loath to provide any sort of young and healthy animal for an experiment which they regarded as nothing but a summary execution. The second trial with a dummy mule went off without a hitch, and at last the local Veterinary Hospital was persuaded to send Methusaleh, who had grown old in service on the Frontier and was now awaiting calmly and dispassionately a swift and humane death.

It is quite sure that Methusaleh had no real conception of the role he was about to play when he saw the unusual bustle on the runway, but some suspicion that his world was changing too rapidly and that perhaps he had lived too long must have percolated through his random musings, for, during the night, he lay down close by the thatched wall of the compound and quietly died.

Pete, the second "volunteer," came from sterner pioneering stock. Younger than his predecessor, he was inclined to be aggressively inquisitive and certainly more restive. Because of this he was given a large dose of a sedative known to the layman as "Mother's Mixture," prior to being strapped down expertly on his airborne mattress. That morning there was a large crowd, composed mostly of sceptics, at the dropping zone. At the exact moment Pete, secure on his platform, was ejected from the 'plane. There was a moment of breathless suspense, and then a concerted sigh of relief as all the parachutes breathed and flowered in the sky and the pontoon sailed levelly and evenly down. A gust of wind caught the pontoon as it bumped the ground and the parachutes bellying dragged it over on its edge until it tottered and fell slowly over pinning Pete beneath.

But already knives were slashing at the webbing straps, and the vets. were inspecting their emergency kit. Freed from his complicated harness, Pete did not appear to be ruffled. He gave us all a very dirty look out of the corner of one bloodshot eye and left the rest to the imagination, as the muleteers stood warily by. Time passed, but the hero of the moment had lost all interest in the proceedings, occasionally turning his head to crop casually at the sparse grass. After twenty minutes, the photographers began to get impatient at this hiatus, and Pete was rolled over and his tail twisted. Cajoled and threatened, he refused to satisfy the despondent observers and in view of the vets.' assurances that nothing had been broken it was assumed that he was only being mulishly stubborn. At the height of a heated discussion as to how to give him a rise in the world, he suddenly jerked himself to his feet and ambled unconcernedly off. The trial had been a success, and in an ensuing small ceremony the first Paramule was presented with an outsize pair of parachute wings worn proudly round the neck and a maroon beret which was perched jauntily between his ears.

For the benefit of representatives from the Special Forces and numerous V.I.P.s Pete gave five more demonstrations without mishap, although the failure of one or more of the parachutes to open completely on occasion gave his sponsors some anxious split seconds. As a result of these trials, this method of mule reinforcement was considered practicable in certain circumstances, and the carefully edited reports together with photographs and detailed blue-prints were jubilantly despatched to higher authority. Back came the immediate reply. "Trial Demand 'X' is now considered obsolete."

This was accepted with all the stoic resignation of pioneer workers, but there was some compensation in the fact that the object of the experiment had been completely achieved, and that Pete, permanently reprieved from the oblivion of the humane killer, was pensioned off and allowed to enjoy his tranquil and comfortable old age.

Current Literature.

TOMLINSON, T. G. **Control by D.D.T. of Flies Breeding in Percolating Sewage Filters.** [Correspondence.] *Nature*. 1945, Oct. 20, 478-9, 1 fig.

Three species of flies—*Anisopus fenestralis*, *Psychoda alternata*, and *Psychoda severini*—often emerge in large number from percolating filters and cause a nuisance. Various methods of control which have been tried are not entirely satisfactory; flooding the filter with sewage is only applicable to suitably constructed filters, and treatment with creosote or bleaching powder, while killing flies, also kills useful scouring organisms, such as Collembola and euchytræid worms, and certain useful bacteria and fungi. Experiments were therefore made with D.D.T. on a large scale at the Minworth Works of the Birmingham Tame and Rea District Drainage Board, together with parallel experiments with creosote and bleaching powder.

During the period April 16-26, 1945, filters were treated with the following substances: creosote (400 gallons per acre), bleaching powder (6½ tons per acre) and D.D.T. as an emulsion (75 lb. D.D.T. per acre). Emerging flies were caught in standard traps.

Creosote caused the greatest reduction in numbers of *Anisopus* but killed all the scouring organisms and the consequent increase of biological film supported a secondary population of *Psychoda*. Bleaching powder caused the biological film to be discharged from the filter and more *Anisopus* emerged later. D.D.T. greatly reduced the numbers of both *Anisopus* and *Psychoda* and did not harm the worms (*Pachydrilus lineatus*) and Collembola (*Achorutes viaticus*) which kept the biological film in check.

The author states that the possibility of using D.D.T. for this purpose at sewage works would depend on its price in comparison with that of other poisons.

J. F. CORSON.

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FINDLAY, G. M. & WILLCOX, R. R. **Infective Hepatitis: Transmission by Fæces and Urine.** *Lancet*. 1945, No. 10, 594-7.

In a previous brief communication Findlay and Willcox (see this *Bulletin*, 1945, v. 20, 248) described the transmission of infective hepatitis to man by oral administration of fæces (unfiltered and Seitz filtrate) and urine. The experiments are here described in detail, together with some additional results obtained since that time.

Fæcal specimens were collected from cases of infective hepatitis in the early icteric stage, usually, on the first or second day of the jaundice and in no case

later than the fifth day. Each volunteer received 50 c.c. of a 1·2 per cent suspension of faeces in milk, by mouth.

Five of the 9 donors provided material which gave positive results, in 25–50 per cent of the recipients, in one group of 3, three groups of 6, and one of 12. In three of the four negative groups only two or three recipients were used so that these specimens also might have given positive results in larger groups. Two of six individuals receiving a Seitz filtrate developed jaundice. Faeces from two of the experimentally produced cases were given to two groups of six men. There were no cases of frank jaundice but two cases of subicteric hepatitis developed in one group and one in the other.

Urine from three of the nine original donors produced jaundice in three of six, one of three, and one of three recipients respectively. The faeces from two of these donors had both given negative results in three recipients. Urine from two other donors was negative; one of these provided positive faeces. Faeces from two of three cases induced by urine gave positive results; faeces from the third case gave negative results in six recipients.

The percentage of positive results in a small group of recipients who received weekly injections of neoarsphenamine as well as the hepatitis material was almost twice as high as that in the group receiving hepatitis material only.

F. O. MACCALLUM.

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DOWNIE, A. W. & PHILLIPS, G. E. **A Typhoid Outbreak at an R.A.F. Station in Bedfordshire.** *Monthly Bull. Ministry of Health and Emergency Pub. Health Lab. Service (directed by Med. Res. Council).* 1945, Nov., v. 4, 229–35, 1 fig. [13 refs.]

Between July 21 and August 17, 1942, 22 cases of typhoid fever occurred at a Royal Air Force camp near Biggleswade, Hertfordshire. All the cases from which the infecting organism was typed were due to bacilli of phage-type A. The evidence did not suggest that infection was spread by milk or food, but the occurrence of a high proportion of the cases in one working-shed where there were taps and drinking-cups, led to a detailed examination of the water supply.

The camp received water from the Biggleswade main supply, and the absence of cases elsewhere made it clear that any pollution must have occurred within the camp. A drain from two latrines near the working-shed referred to ran, with only a slight fall, across the camp to join the main sewer. This drain was partially blocked, and sewage leaked from the drain and around the brickwork of the manholes at certain points. This section was only three yards from, and slightly above, the water pipe leading to the shed, and fluorescein tests proved that contamination might pass to the pipe in three minutes. A booster pump, used in the event of fire, was run for a few minutes daily, and caused rapid fluctuation of the pressure in the main. This might have aided entry of the polluted material to this pipe, the joints of which were found to be "weeping" at this point, and perhaps to other pipes throughout the camp.

An intensive search was made by bacteriological and serological methods amongst the persons using the latrines, but no carrier was found. There had been numerous changes of personnel since the probable date of infection.

J. C. CRUICKSHANK.

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SCHAMBERG, I. L. **The Prognosis of Syphilis. A Critical Review of Clinical, Autopsy, and Life Insurance Studies.** *Amer. J. Syph.* 1945, Sept., v. 29, No. 5, 529-50. [73 refs.]

The prognosis of syphilis is notoriously difficult; this article is a painstaking attempt to review critically various studies carried out in recent times on prognosis and mortality.

The mortality rate is assessed by government mortality reports, clinical studies, death and autopsy studies, and life insurance studies. Most of the governmental reports are unreliable mainly because certain diseases are attributed to syphilis without sufficient evidence, e.g. angina pectoris, cirrhosis of the liver, Bright's disease and diseases of arteries. Clinical studies suggest that syphilis definitely shortens life, but the stage at which treatment is begun and the adequacy of treatment both affect the prognosis to such an extent that comparisons are almost valueless unless these factors are taken into consideration. Autopsy studies give the incidence of syphilis as anything from 2.6 to 29.5 per cent—a sufficient indication that this method is unreliable: in any case sero-negative syphilitics are likely to be overlooked and thus figures tend to be higher than they should be. Life insurance figures give the percentage of deaths due to syphilis as anything from 2.2 to 26.0, another indication of the difficulty of obtaining a reasonably exact figure.

Increased mortality amongst syphilitics is mainly due to late neurological and cardiovascular manifestations, and this is inversely proportional to adequacy of treatment. Deaths from syphilis are highest among labourers and lowest among the professional and well-to-do classes, skilled artisans and the like occupying an intermediate position.

It is concluded that (1) syphilis in itself—apart from the well known late serious manifestations—does not shorten life, nor does it predispose to such other diseases as tuberculosis, pneumonia, nephritis, etc.; (3) life insurance companies should take a wider view of the disease and accept all persons without questions or carry out serum tests on all applications and not "load" policies in the case of those who have been well treated.

This article contains a mass of figures and six tables: there are 73 references.

T. E. OSMOND.

Reprinted from "Bulletin of Hygiene," Vol. 21, No. 2, 1946.

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JOURNAL OF THE ROYAL ARMY MEDICAL CORPS

Corps News.

JULY, 1946.

FROM "THE LONDON GAZETTE."

June 20, 1946.

O.B.E. ("in the field")

Davy, A/Col. R. D., *M.C.*

MENTIONED ("in the field")

Bray, Pte. N. B. G., 7357007.

EFFICIENCY DECORATION

Lister, Lt.-Col. (Hon. Col.) W. A.

Patterson, Lt.-Col. (Hon. Col.) W. H. D.

Anderson, Lt.-Col. J. C., *O.B.E.*

Briggs, Maj. (T/Lt.-Col.) T. F.

Everatt, Maj. (Hon. Lt.-Col.) W. R.

Myles, Maj. (Hon. Lt.-Col.) J. J.

Wattsford, Hon. Maj. H. F.

Davie, Capt. (Hon. Maj.) R. E., *M.C.* (T.A.R.O.)

McDowell, Capt. (Hon. Maj.) J. G.

Blackstock, Capt. W. P.

June 14.—Col. R. G. Shaw, *O.B.E.*, *M.C.* (4923), late R.A.M.C., retires on ret. pay, June 13, 1946, and is granted the hon. rank of Brig.

Short Service Comms.

The undermentioned are apptd. to permanent comms. retaining their present seniority:—

Apr. 1, 1945 :—

Capt. H. Foster, M.B. (127633).

June 18, 1945 :—

Capt. D. B. Watson, M.B. (136270).

Nov. 21, 1945 :—

Capt. D. W. Moynagh, M.B. (157583).

Feb. 27, 1946 :—

Capt. R. M. Vanreenan, M.B. (68355).

Apr. 24, 1946 :—

Capt. J. H. Brodie, M.B. (183775).

June 21.—Maj.-Gen. G. Wilson, *C.B.*, *C.B.E.*, *M.C.* (26291), late R.A.M.C., retires on ret. pay, June 20, 1946.

The undermentioned Lts. (Qr.-Mr.) (War Subs. Cpts. (Qr.-Mr.)) from Emerg. Comms. to be Lts. (Qr.-Mr.) :—

June 16, 1945 :—

Stanley Alonzo Lane (99210).

Oct. 2, 1945 :—

George Methuen Belmont Smith (99211).

Oct. 23, 1945 :—

William John Jolly, *M.B.E.* (99212).

June 25.—Col. (now Maj.-Gen.) W. Foot, *M.C.* (15373), to be actg. Maj.-Gen., May 14, 1946.

Col. (Actg. Maj.-Gen.) R. W. Galloway, *C.B.*, *C.B.E.*, *D.S.O.* (5839), late R.A.M.C., to be Maj.-Gen., June 20, 1946.

Lt.-Col. D. H. Murray, (14548), from R.A.M.C., to be Col., June 20, 1946, with seniority Nov. 28, 1944.

The undermentioned to be Lt.-Cols.:—

May 27, 1946 :—

Maj. (War Subs. Lt.-Col.) V. C. Verbi, *O.B.E.* (41310).

June 20, 1946 :—

Maj. H. C. Benson (41285).

Capt. C. D. Salmond (99323) is placed on the h.p. list on account of disability, June 25, 1946.

June 28.—Maj.-Gen. O. W. McSheehy, *C.B.*, *D.S.O.*, *O.B.E.*, is appointed Col. Comdnt., June 30, 1946, vice Maj.-Gen. H. P. W. Barrow, *C.B.*, *C.M.G.*, *D.S.O.*, *O.B.E.*, who attains the age limit for the appt. on that date.

Lt.-Col. P. J. Ryan, *M.C.* (5717), retires on ret. pay, June 26, 1946, and is granted the hon. rank of Col.

Lt.-Col. G. T. Garraway (14974) retires on ret. pay, June 27, 1946, and is granted the hon. rank of Col.

July 2.—The undermentioned to be Cols.:—

Lt.-Col. E. Underhill, M.B. (15785), from R.A.M.C., June 30, 1946, with seniority Nov. 28, 1944.

Lt.-Col. J. M. Macfie, *C.B.E.*, *M.C.*, M.B. (14140), from R.A.M.C., July 2, 1946, with seniority, Jan. 26, 1945.

Col. F. C. K. Austin, M.D. (15533), late R.A.M.C., on completion of four years in the rank is retained on the Active List (supern.), July 2, 1946.

Maj. G. F. Harrison, M.B. (41322), to be Lt.-Col. June 30, 1946.

Maj. (War Subs. Lt.-Col.) J. M. Ryan, M.B. (41398), to be Lt.-Col. July 2, 1946.

Maj. (Qr.-Mr.) H. M. Prince, *M.B.E.*, *B.E.M.* (56852), to be Lt.-Col. (Qr.-Mr.), July 1, 1946.

July 5.—Colonel (temp. Brigadier) A. E. Richmond, *C.B.E.*, late R.A.M.C., is appointed Honorary Surgeon to The King, with effect from June 20, 1946, vice Major-General G. Wilson, *C.B.*, *C.B.E.*, *M.C.*, M.B., late R.A.M.C., retired.

Lt.-Col. A. E. Richmond, *C.B.E.*, (9946) from R.A.M.C., to be Col. Oct. 29, 1945, with seniority July 1, 1942. (Substituted for the notfn. in *Gazette* (Supplement) dated Nov. 19, 1945.)

Col. R. W. Galloway, *C.B., C.B.E., D.S.O., M.B.* (5839), late *R.A.M.C.*, to be *D.D.M.S.* and to be granted the actg. rank of *Maj.-Gen.*, May 27, 1946.

Col. H. A. Sandiford, *M.C., M.B., K.H.P.* (15676), late *R.A.M.C.*, to retire on ret. pay, June 30, 1946, and to be granted the hon. rank of *Brig.*

The notifi. regarding *Maj.* (War Subs. Lt.-Col.) W. J. Officer, *O.B.E., M.B.* (21400), in *Gazette* (Supplement) dated May 3, 1946, to be ante-dated Apr. 21, 1946.

The notifi. regarding *Maj.* H. G. G. Robertson (41303) in *Gazette* (Supplement) dated May 21, 1946, to be ante-dated Apr. 24, 1946.

The notifi. regarding *Maj.* E. M. Hennessy, *M.B.* (41298), in *Gazette* (Supplement) dated May 28, 1946, to be ante-dated May 1, 1946.

The undermentioned *Lts. (Qr.-Mr.)* (War Subs. Cpts. (*Qr.-Mr.*) to be *Cpts. (Qr.-Mr.)* :—

Sept. 9, 1945 :—

S. A. Lane (99210).

Oct. 2, 1945 :—

G. M. P. Smith (99211).

Oct. 23, 1945 :—

W. J. Jolly, *M.B.E.* (99212).

July 9.—Colonel E. B. Marsh, *M.C., M.B., M.R.C.P.*, late *R.A.M.C.*, to be actg. *Maj.-Gen.*, May 1, 1946.

July 12.—Lt. (*Qr.-Mr.*) (War Subs. Capt. (*Qr.-Mr.*)) A. W. Langley to be *Capt. (Qr.-Mr.)*, Sept. 9, 1945.

Short Service Commns.

Capt. L. A. S. Edmondson retires, July 6, 1946.

Capt. H. A. Bowker retires, July 15, 1946, and is granted the hon. rank of *Maj.*

July 16.—Major R. L. Whittaker (44795) to be *Lt.-Col.* July 16, 1946.

Maj. J. E. Snow, *O.B.E.* (44393) to be *Lt.-Col.*, July 16, 1946.

Maj. (War Subs. Lt.-Col.) J. G. Black, *M.B.* (42435), to be *Lt.-Col.* July 17, 1946.

Lt.-Col. G. B. Wild (15758), on reaching the age for retirement, is retained on the Active List supern., July 16, 1946.

Short Service Commns.

The undermentioned *Cpts.* are apptd. to a permanent commn., retaining their present seniority :—

Feb 1, 1942 :—

K. P. Brown, *M.B.* (74435).

Aug. 1, 1943 :—

A. B. Fountain (85435).

Aug. 24, 1944 :—

N. G. G. Talbot, *O.B.E., M.B.* (86207).

Jan. 31, 1945 :—

I. A. Walsh (120155).

Feb. 26, 1945 :—

J. H. McLaughlin, *M.B.* (125327).

Jan. 1, 1946 :—

J. M. Laferla, *M.D.* (169199).

Jan. 3, 1946 :—

F. G. Neild (163695).

Feb. 21, 1946 :—

A. Grieve (173447)

Lt. Norman Graham Guy Talbot, *O.B.E., M.B.* (86207), from *R.A.M.C., T.A.*, is granted a short service commn. in the rank of *Lt.*, Aug. 24, 1939, and to be *Capt.*, Aug. 24, 1940.

Lt. (War Subs. Capt.) John Herbert McLaughlin, *M.B.* (125327), from *R.A.M.C. (E.C.)*, is granted a short service commn. in the rank of *Lt.*, Feb. 26, 1940, and to be *Capt.* Feb. 26, 1941.

Lt. (War Subs. Capt.) Ringland Gilmore Boyd, *M.C., M.B.* (227634), from *R.A.M.C. (E.C.)*, is granted a short service commn. in the rank of *Lt.*, Apr. 4, 1942, and to be *Capt.* Apr. 4, 1943.

Lt. (War Subs. Capt.) Thomas Chamney Russell Archer (248812), from *R.A.M.C. (E.C.)*, is granted a short service commn. in the rank of *Lt.*, Oct. 24, 1942, and to be *Capt.*, Oct. 24, 1943.

Lt. (War Subs. Capt.) Sydney Hicks Roe, *M.B.* (270461), from *R.A.M.C. (E.C.)*, is granted a short service commn. in the rank of *Lt.*, Apr. 10, 1943, and to be *Capt.*, Apr. 10, 1944.

War Subs. Capt. Henry Anthony Ferrante, *M.D.* (171593), from *R. Malta Art. (E.C.)*, is granted a short service commn. in the rank of *Lt.*, Jan. 18, 1941, and to be *Capt.*, Jan. 18, 1942, with pay under Art. 276 *R.W.*, from May 6, 1946.

July 19.—

Short Service Commns.

Capt. (War Subs. *Maj.*) P. H. Ball (70113) is apptd. to a permanent commn. retaining his present seniority, Oct. 30, 1940.

Capt. (War Subs. *Maj.*) O. W. W. Clarke (72167) is apptd. to a permanent commn. retaining his present seniority, Apr. 23, 1942.

Capt. J. B. Plews, *M.B.* (74434), is apptd. to a permanent commn. retaining his present seniority, Feb. 1, 1943.

Lt.-Col. E. O. A. Singer, *M.B., M.R.C.P.* (1846), having attained the age for retirement, is retained on the Active List (supern.), July 16, 1946.

Lt.-Col. J. D'A. Champney (15683), having attained the age for retirement, is retained on the Active List (supern.), July 17, 1946.

July 23.—*Maj.-Gen.* G. A. Blake, *C.B., M.B., K.H.S.*, late *R.A.M.C.*, retires on ret. pay, July 22, 1946.

Maj.-Gen. J. C. A. Dowse, *C.B., C.B.E., M.C., M.B.*, late *R.A.M.C.*, is appointed Honorary Physician to The King with effect from June 30, 1946, vice *Col.* (temp. *Brig.*) H. A. Sandiford, *M.C., M.B.*, late *R.A.M.C.*, retired.

Maj.-Gen. E. A. Sutton, *C.B.E., M.C.*, late *R.A.M.C.*, is appointed Honorary Surgeon to The King, with effect from July 22, 1946, vice *Maj.-Gen.* G. A. Blake, *C.B., M.B.*, late *R.A.M.C.*, retired.

Short Service Commns.

Capt. Alexander Buchanan Dick, *M.B.* (87858), from *R.A.M.C. (T.A.)*, to be *Lt.*, Sept. 2, 1939, and to be *Capt.*, Sept. 2, 1944.

Lt. (War Subs. Capt.) John Phillimore Mitchell, *M.B.* (248756), from *R.A.M.C. (E.C.)*,

to be Lt., Oct. 31, 1942, and to be Capt., Oct. 31, 1943.

Short Service Comms. (Specialist).

The undermentioned to be Capts., June 25, 1946 :—

War Subs. Maj. A. G. Wright, M.B., D.P.H. (115954), from R.A.M.C. (E.C.).

War Subs. Maj. A. Torrie, M.B. (188401), from R.A.M.C. (E.C.).

War Subs. Maj. E. H. Larkin, M.B. (282699), from R.A.M.C. (E.C.).

Capt. R. M. Henderson, M.B. (125003), from R.A.M.C. (S.S.).

War Subs. Capt. R. T. Wordingham, M.B. (110075), from R.A.M.C. (E.C.).

War Subs. Capt. J. J. Voller (370069), from R.A.M.C. (E.C.).

Lt. (War Subs. Capt.) R. T. Fletcher, M.D. (119618), from R.A.M.C. (E.C.).

Lt. (War Subs. Capt.) J. C. Scott (150245), from R.A.M.C. (E.C.).

The undermentioned Capts. (Qr.-Mr.) to be Majs. (Qr.-Mr.), July 1, 1946 :—

A. G. Williams (63667). H. W. Reeves (66209). F. T. Catton (66318). H. G. Smith (66767). (War Subs. Lt.-Col.) A. E. Woodward (66768). H. Gregory (69515). W. E. L. Eason

(70953). S. W. Hobday, M.B.E. (71262). J. W. F. Munden (71507). E. F. Taylor (71670). A. E. Taylor, M.B.E. (73314). W. V. Dixon (74043). H. W. M. Stewart (74090). W. R. Day, M.B.E. (74091).

July 26.—Col. E. U. Russell, M.C. (4879) retires on ret. pay, July 26, 1946, and is granted the hon. rank of Brig.

Short Service Comms.

The undermentioned are apptd. to permanent comms. retaining their present seniority :—

Oct. 25, 1939 :—

War Subs. Maj. J. J. Sullivan, M.B. (65521).

May 4, 1941 :—

War Subs. Maj. P. Coleman, M.B. (67858). Nov. 1, 1943 :—

War Subs. Maj. R. G. Davies (78637).

May 1, 1944 :—

Capt. J. J. McGrath, M.B. (89977).

Lt. (War Subs. Capt.) Donald Macdonald, M.B. (322470), from R.A.M.C. (Emerg. Commn.) to be Lt., June 3, 1944, and to be Capt., June 3, 1945.

Capt. W. A. Groom (49674) retires July 26, 1946.

AIRBORNE FORCES CLUB

Membership of the above Club is open to anyone who holds or has held Commissioned Rank in any of the following formations :—

H.Q., Airborne Forces or Airborne Corps.

1st and 6th Airborne Divisions. 44th Indian Airborne Division.

Airborne Establishments.

Directorate of Air, War Office.

Glider Pilot Regiment.

S.A.S.

S.O.E.

Officers of the Royal Navy, R.N.R. or R.N.V.R. who qualified as parachutists and operated with Airborne Forces.

Officers of the R.A.F. who were either parachute instructors at Ringway or members of 38 Gp. or 46 Gp. during the period of an Airborne Operation.

Lady Members are eligible if they are the wife, mother, sister, or daughter (over 18) of a member.

The Club Committee has decided to accept the offer of premises in Whitehall Court. There are three clubrooms: a "mixed" room (the biggest of the three), which looks

out over the Thames, with a 20-foot balcony; and two smaller rooms for use as a dining-room, and a bar for men only. There are about 120 bedrooms shared with eight other clubs, available in the building; there is also a barber's shop, a general restaurant and a squash court.

Subscriptions are as follows :

Town Members (50 mile radius) £3 13s. 6d.

(Ladies £2 2s. 0d.)

Country Members £1 11s. 6d.

(Ladies £1 1s. 0d.)

Overseas Members £1 1s. 0d.

There is an entrance fee of £1 1s. 0d. to cover capital charges, small structural alterations, etc.

A Club tie with a maroon background and small "pegasi" on it is being manufactured.

It is hoped that the Club will be opened as soon as the support is great enough—this should be on or possibly before September 1, 1946.

Application Forms can be obtained on request from the Hon. Sec., Airborne Forces Club, Whitehall Court, S.W.1.

DEATHS.

McLENNAN.—In Aberdeen on May 27, 1946, Colonel Farquhar McLennan, D.S.O., late R.A.M.C., Retired. Born in Loch Carron, Ross, Sept. 29, 1872, he took the M.B. Aberdeen, in 1898 and entered the R.A.M.C. as Lieutenant April 25, 1900. Promoted Captain April 25, 1903, Major April 25,

1912, Brevet Lieutenant-Colonel Jan. 1, 1917, substantive Lieutenant-Colonel Dec. 26, 1917 and Brevet Colonel June 3, 1919, he retired with the Rank of Colonel June 21, 1924. He was Adjutant, Highland Division, T.F., Nov. 1, 1911, to Nov. 19, 1915, D.A.D.G. Army Medical Services, War Office, Nov. 20,

1915, to Jan. 20, 1918, and after retirement, he held the Retired Pay appointment at Aberdeen Aug. 21, 1924, till Sept. 28, 1937. He took part in the Campaign in Somaliland in 1902-1904, receiving the Medal with Clasp. He served in France from Jan., 1918, till Nov., 1919. Twice mentioned in despatches, he received the Brevets of Lieutenant-Colonel and Colonel, the *D.S.O.*, and British War and Victory Medals. His son, Major Alastair McLennan, is now serving in the Corps.

BLACKWELL.—In Dolphin, Broadoak, Sussex, on 9 July, 1946, Major-General William Richard Blackwell, *C.B.*, *C.M.G.*, late *R.A.M.C.* Retired. Son of Captain T. S. Blackwell, he was born in Dublin, Jan. 25, 1877. He was appointed Lieutenant *R.A.M.C.* July 27, 1899. Promoted Captain July 27, 1902, Major April 27, 1911, Lieutenant-Colonel March 1, 1915, Brevet Colonel June 3, 1919, substantive Colonel Dec. 26, 1925 and Major-General Sept. 16, 1929, he retired Dec. 9, 1933. He was created *C.B.* June 2, 1931. He was appointed Honorary Surgeon to the Viceroy of India, March 1, 1920, and Honorary Surgeon to the King May 1, 1930. Created an Esquire of the Order of St. John Dec. 15, 1915, he was promoted Officer June 12, 1926. He served as an *A.D.M.S.* in India June 3, 1919, to Jan. 24, 1924, and Dec. 26, 1925, to Jan. 2, 1927. He was *D.D.M.S.* and Director of Hospital Organization in India from Jan. 3, 1927, to Sept. 1, 1929. Having been *D.A.D.G.*, *W.O.* (April 1, 1914), till March 31, 1916, he was Deputy Director-General, *A.M.S.*, War Office, Sept. 27, 1929, till Sept. 15, 1933. He returned to the Active List, as *D.D.M.S.*, Gibraltar, April 23, 1940, till May 14, 1941. In the South African Campaign of 1899-1902, he took part in the actions at Belfast (Aug. 26 and 27, 1900) and Lydenburg (Oct. 5 to 8, 1900) and in the operations in the Orange River

Colony. Mentioned in despatches, he received the Queen's Medal with three Clasps and the King's Medal with two Clasps. He served in France in Oct., 1914, and from April 10, 1916, till April 13, 1919, as Medical Inspector of Drafts, *G.H.Q.*, 1916-1918, and Assist. Director-General, Army Medical Services, France, in 1918 and 1919. Thrice mentioned in despatches he was created *C.M.G.*, received the Brevet of Colonel, *Croix d'Officier*, *Legion d'Honneur*, 1914 Star, British War and Victory Medals. He again saw service in the third Afghan War, 1919, receiving the Medal with Clasp. As mentioned above he was *D.D.M.S.*, Gibraltar, in 1940 and 1941, being again mentioned in despatches.

A brother Officer writes: "In the death of General Blackwell the *R.A.M.C.* has lost one of the most popular Officers who have ever served in the Corps.

"Bill Blackwell was a very lovable man, gifted with great charm of manner, popular with all ranks and all branches of the Army and a friend to all men.

"The many high offices that he held, firstly in *A.M.D.I.*, then at *G.H.Q.* in France, followed by several years at Simla and, finally, as Deputy Director-General at the War Office, gave him full opportunity of exercising his great gifts and enabled him to give a helping hand to both officers and men and to advise in the ways and affairs of the world, the Army and the Corps, in all of which matters his wide experience had well qualified him, and many are the officers and men who are under a deep debt of gratitude for help and advice which he was always so able and willing to give.

"His life was devoted to the service of the Corps and the Corps has lost not only a very distinguished officer but a very loved comrade and those who had the pleasure of serving with him will mourn the loss of a charming companion and a very dear friend."

JOURNAL OF THE ROYAL ARMY MEDICAL CORPS

Corps News.

AUGUST, 1946.

FROM THE "LONDON GAZETTE."

Royal Army Medical Corps.

July 30.—Capt. (War Subs. Maj.) E. H. Evans (70122) retires July 29, 1946, and is granted the hon. rank of Maj.

Lt.-Col. C. L. Emmerson (15651) retires on ret. pay, July 30, 1946, and is granted the hon. rank of Col.

Short Service Commn.

War Subs. Capt. David Lennox Scott (336112) from R.A.M.C. (Emerg. Commn.) to be Lt., Nov. 18, 1944, and to be Capt., Nov. 18, 1945.

The Army Dental Corps.

The undermentioned Capt. to be Maj., July 1, 1946 :—

- C. O. B. Stibbs (65830).
- A. E. Allan (69232).
- J. E. Maywhort (69257).
- J. A. M. Gemmell (69255).
- S. J. Gittings, *M.B.E.* (70176).
- E. A. Moore (71861).
- L. K. Caygill (73871).
- E. Ferguson, *M.B.E.* (76736).
- G. Johnstone (75003).
- J. B. Burgess (75001).
- V. Vella-Grech (75002).
- P. R. W. Harvey (75328).
- E. D. Stanhope, *M.B.E.* (79116).
- J. B. Hardie, *M.B.E.* (78389).

Royal Army Medical Corps.

August 2.—Lt.-Col. R. N. Phease, *M.B.* (1256), having attained the age for retirement, is retained on the Active List (supern.), Aug. 1, 1946.

Short Service Commn.

War Subs. Capt. Harry Raymond Vincent (318061) from R.A.M.C. (Emerg.) Commn. to be Lt., May 13, 1944, and to be Capt., May 13, 1945.

The Army Dental Corps.

Capt. F. M. Kay (141373) Short Service Commn. is apptd. to a permanent commn., July 24, 1946, retaining his present seniority.

Lt.-Col. S. A. McCormack (14385), having attained the age limit for retirement, retires on ret. pay, Aug. 1, 1946.

August 6.—Col. J. G. Gill, *C.B.E.*, *D.S.O.*, *M.C.* (8368), late R.A.M.C., retires on ret. pay,

Aug. 5, 1946, and is granted the hon. rank of Maj.-Gen.

Maj. (War Subs. Lt.-Col.) D. A. O. Wilson, *M.B.* (32287), to be Lt.-Col. Aug. 1, 1946.

August 9.—Lt.-Col. A. J. Beveridge, *O.B.E.*, *M.C.*, *M.B.* (8619), from R.A.M.C., to be Col., May 1, 1946, with seniority, Oct. 21, 1944 (Substituted for the notifn. in *Gazette* (Supplement) dated May 14, 1946.)

Lt.-Col. J. T. Johnson, *D.S.O.*, *M.D.* (33124), R.A.M.C. Ret. Re-Empld. is restored to the rank of Col. on ceasing to be re-empld., June 30, 1946.

Col. R. B. Leslie, *M.C.* (5351), retires on ret. pay, Aug. 8, 1946, and is granted the hon. rank of Brig.

Royal Army Medical Corps.

Maj. C. Ryles, *O.B.E.*, *M.B.* (12585), ret. re-empld., on ceasing to be re-empld., is granted the hon. rank of Col. Aug. 3, 1946.

Capt. (War Subs. Maj.) D. N. Keys, *M.B.* (65322), retires Aug. 8, 1946, and is granted the hon. rank of Lt.-Col.

Capt. C. Heim, *D.S.O.*, *O.B.E.*, *M.C.* (36273), having exceeded the age limit, ceases to belong to the Res. of Offrs., Aug. 7, 1946, and is granted the hon. rank of Col.

August 13.—Capt. J. A. V. Nicoll (70123) to be Maj., May 1, 1946.

Maj. J. V. McNally, *M.B.* (5826), retires on ret. pay, Aug. 11, 1946, and is granted the hon. rank of Lt.-Col.

Short Service Commns.

Capt. W. Wyndson (77058) is apptd. to a permanent commn., Sept 1, 1942, retaining his present seniority.

Capt. A. B. Dick, *M.B.* (87858) is apptd. to a permanent commn., Sept 2, 1944, retaining his present seniority.

Capt. E. P. Jowett (85408) retires, Aug. 11, 1946, and is granted the hon. rank of Maj.

The undermentioned Capt. (Qr.-Mrs.) to be Maj. (Qr.-Mrs.), July 1, 1946 :—

- L. I. Tuson (75330).
- J. T. Conway (75478).
- A. Steer, *M.M.* (75479).
- W. E. Conway, *M.M.* (75653).
- J. H. Plumbridge, *M.B.E.* (76461).
- W. C. Ross, *M.B.E.*, *D.C.M.* (76581).
- J. E. McNeill, *D.C.M.* (76542).
- E. E. Spring, *M.B.E.* (86284).

The Army Dental Corps.

August 13.—Capt. H. J. Pegler (51049), having exceeded the age limit of liability to recall, ceases to belong to the Res. of Offrs., Aug. 13, 1946, and is granted the hon. rank of Maj.

August 16.—Lt.-Col. T. H. Sarsfield, *O.B.E.* (15326), from R.A.M.C., to be Col., Aug. 12, 1946, with seniority, Feb. 15, 1945.

Capt. C. Reburn (9264) retires, Aug 11, 1946, and is granted the hon. rank of Maj.

Short Service Commn. (Specialist).

The personal number of Capt. J. J. Voller (270069) is as now described and not as notified in *Gazette* (Supplement) dated July 23, 1946.

Short Service Commns.

War Subs. Capt. John McQuillan, M.B. (111764), from R.A.M.C. (E.C.) to be Lt., Nov. 23, 1939, and to be Capt., Nov. 23, 1940.

Capt. J. McQuillan, M.B. (111764), is apptd. to a permanent commn., Nov. 23, 1944, retaining his present seniority.

August 20.—Maj. (War Subs. Lt.-Col.) A. N. B. Odbert, *O.B.E.*, M.B. (42438), to be Lt.-Col., Aug. 12, 1946.

The Army Dental Corps.

Maj. J. McL. Foreman (14354), to be Lt.-Col., Aug. 1, 1946.

Short Service Commns.

Lt. (War Subs. Capt.) Norman James Crane (336058) from Emerg. Commn. A.D. Corps, to be Lt., Nov. 27, 1944, and to be Capt., Nov. 27, 1945.

Lt. (War Subs. Capt.) Gordon Arthur Elliott (338646) from Emerg. Commn. A.D. Corps, to be Lt., Feb. 12, 1945, and to be Capt., Feb. 12, 1946.

August 15.

The King has been pleased to grant unrestricted permission for the wearing of the following decorations which have been conferred on the undermentioned personnel in recognition of distinguished service in the cause of the Allies :—

**LEGION OF MERIT,
DEGREE OF OFFICER.**

Major-General Sir Edward Phillips, *K.B.E.*, *C.B.*, *D.S.O.*, *M.C.*, M.B. (8555), late Royal Army Medical Corps.

BRONZE STAR MEDAL.

Colonel (temporary) Thomas Parr, M.D. (8723), Royal Army Medical Corps.

August 22.

MENTIONED (Far East).

Capt. D. L. Broadhead (336816).

Capt. D. H. K. Soltan, M.B. (325439).

August 23.—Col. G. F. Charles, *C.B.E.* (15721), late A.D. Corps, retires on ret. pay Aug. 16, 1946.

Lt.-Col. H. J. Higgins, *O.B.E.* (15754), from A.D. Corps, to be Col., Aug. 16, 1946, with seniority, Oct 17, 1944.

Royal Army Medical Corps.

Short Service Commns.

The undermentioned are apptd. to permanent commns., retaining their present seniority:

Sept. 1, 1942.—War Subs. Maj. J. C. Babbage, M.B. (75669).

August 14, 1946.—Capt. T. B. Harrison, M.B. (195467).

Maj. (Qr.-Mr.) A. V. Heggie, *M.B.E.* (47484), having exceeded the age for retirement, is placed on ret. pay, Aug. 23, 1946.

DEATHS.

MORTON.—In Berwick-on-Tweed on Aug. 7, 1946, Colonel Hugh Murray Morton, *C.B.E.*, *D.S.O.*, late R.A.M.C., Retired. Born in Longtown, Cumberland, Aug. 26, 1873, he took the M.B. Edinburgh in 1896, and was commissioned Lieutenant, R.A.M.C., Nov. 17, 1899. Promoted Captain Nov. 17, 1902, Major May 17, 1911, and Lieutenant-Colonel March 1, 1915, he retired with the rank of Colonel Nov. 20, 1924. He held the Retired Pay appointment at Berwick-on-Tweed from Jan. 10, 1925, till Aug. 25, 1938. He was re-employed for a short time at the beginning of the 1939-45 war, and was Sheriff of Berwick-on-Tweed 1943-1944. His son, Major Ian Hugh Carruthers Morton, is serving in the Corps. In South Africa 1899-1902, he took part in the Relief of Ladysmith, including the actions at Spion Kop and Vaal Kranz, operations on Tugela Heights (Feb. 14 to 27, 1900), and action at Pieters Hill, operations in Natal, March to June, 1900, including actions at Laings Nek (June 6 to 9, 1900), and operations in Transvaal. He received the Queen's Medal with

five Clasps and the King's Medal with two Clasps. He served in Gallipoli July, 1915, to Jan, 1916, in Egypt Jan. to March, 1916, and in Mesopotamia from March, 1916, till May, 1919. Thrice mentioned in despatches, he was created *C.B.E.*, awarded the *D.S.O.*, 1914-15 Star, British War and Victory Medals.

BLACKWELL.—Colonel A. O. B. Wroughton writes :—

"General W. R. Blackwell, known to all his friends as Billy, was in the batch after mine, and I first met him at Aldershot when I had just passed out of the Depot and he arrived. From then all through my service I met him and we were on Lieut.-General Sir Charles Burtchael's staff at A.H.Q., Simla, together. Billy as A.D.M.S. Mobilization, etc., and I as A.D.M.S. Personnel.

"I have never met anyone more loved by all ranks and most deservedly so. He always gave a helping hand to all in need.

"It was a shock to see the notice and I, with others, will miss him sadly."

Vitamins in diseases of the mouth

Unhealthy oral conditions may result from dietary deficiencies. Appropriate correction of such deficiencies at an early stage may prevent the development of more serious conditions.

VITAMIN A deficiency.

This may cause hyperkeratosis of the gums as well as overgrowth of epithelia elsewhere. It causes hypoplasia of the enamel organ in experimental animals and there is evidence that vitamin E deficiency has a somewhat similar effect.

VITAMIN D deficiency.

This affects the developing enamel, dentine and alveolar bone. Calcium deficiency aggravates its effects.

VITAMIN B₁ deficiency.

Small herpetiform vesicles may appear under the tongue or on the palate. They clear up quickly on vitamin B₁ treatment.

RIBOFLAVIN deficiency.

This produces cheilosis and a magenta-coloured glossitis, unaccompanied by gingivitis (unless this arises from other causes).

NICOTINIC ACID deficiency.

The specific glossitis is fiery red and painful. Gingivitis characteristically accompanies it (contrast riboflavin deficiency) also generalised symptoms — weakness, lassitude, insomnia, headache.

ASCORBIC ACID deficiency.

Hyperæmia occurs with swelling of the interdental and marginal regions of the gums which are tender and bleed easily. The gingivitis though not directly due to the deficiency usually responds to ascorbic acid administration.

Further particulars of the various vitamin products available for the above conditions are obtainable on request from:

VITAMINS  LIMITED

(Dept. R.A.X.G.), Upper Mall, London, W.6.

JOURNAL OF THE ROYAL ARMY MEDICAL CORPS

Corps News.

SEPTEMBER, 1946.

FROM THE "LONDON GAZETTE."

August 27.

Royal Army Medical Corps.

Maj. (War Subs. Lt.-Col.) C. A. Levy (40884) to be Lt.-Col. Aug. 24, 1946.

Lt.-Col. T. L. Fraser, *O.B.E.*, M.B. (5607) retires on ret. pay, Aug. 24, 1946, and is granted the hon. rank of Col.

Lt.-Col. L. S. C. Roche, *M.C.* (14377), on attaining the age for retirement, is retained on the Active List (supern.), Aug. 27, 1946.

August 29.

MENTIONED (Defence of Hong Kong).

Maj. D. C. Bowie, *O.B.E.*, M.B., F.R.C.S.

MENTIONED (Field). -

7357043 S.Sgt. G. Edwards.

4454514 Pte. R. Wood.

August 30.—Col. R. R. G. Atkins, *O.B.E.*, *M.C.*, M.D. (5754), late R.A.M.C., retires on ret. pay, Aug. 12, 1946, and is granted the hon. rank of Brig.

Maj. (War Subs. Lt.-Col.) S. W. K. Arundell (42434) to be Lt.-Col., Aug. 27, 1946.

Short Service Commissions.

Capt. T. G. A. L. Warrington, M.D. (75592) is apptd. to a permanent comm., May 1, 1943, retaining his present seniority.

Capt. S. P. Bellmaine (96278) retires Aug. 15, 1946, and is granted the hon. rank of Maj.

War Subs. Maj. G. G. Smith (70110) retires Aug. 30, 1946, and is granted the hon. rank of Lt.-Col.

REGULAR ARMY RESERVE OF OFFICERS.

The Army Dental Corps.

Capt. H. Broughton (51046) having exceeded the age limit of liability to recall, ceases to belong to the Res. of Offrs., Aug. 28, 1946, and is granted the hon. rank of Maj.

September 3.—Lt.-Col. H. T. Findlay, M.B. (1845), from R.A.M.C. to be Col., Sept. 2, 1946, with seniority, Feb. 19, 1945.

Lt.-Col. G. ap G. Jones (27806), from A.D. Corps to be Col., Sept. 1, 1946, with seniority Oct. 25, 1945.

Maj.-Gen. A. B. Austin, *C.B.*, K.H.D.S. (15744), late A. D. Corps, Director, Army Dental Service, on completion of tenure of appt. is retained on the Active List (supern.), Sept. 1, 1946.

Royal Army Medical Corps.

Major (War Subs. Lt.-Col.) A. N. T. Meneces,

C.B.E., *D.S.O.*, M.B. (44406), to be Lt.-Col., Sept. 2, 1946.

Lt.-Col. G. G. Drummond (20289) having attained the age for retirement, is retained on the Active List supern., Aug. 24, 1946.

Lt.-Col. J. C. Denvir, M.B. (19372), retires on ret. pay, Sept. 2, 1946, and is granted the hon. rank of Col.

Short Service Commission.

War Subs. Maj. W. Thomson, M.D. (66331), retires July 21, 1946, and is granted the hon. rank of Maj. (Substituted for the notifi. in *Gazette* (Supplement) dated June 25, 1946.)

September 6.—Col. E. W. Wade, *D.S.O.*, *O.B.E.*, M.D. (8131), late R.A.M.C., retires on ret. pay, Sept. 6, 1946, and is granted the hon. rank of Brig.

Royal Army Medical Corps.

Lt.-Col. A. G. Harsant, *O.B.E.*, M.S., F.R.C.S. (5767) to be a Consultant, Nov. 28, 1945, and is granted the local rank of Brig.

Capt. (War Subs. Maj.) R. H. Baird, M.B. (100954) retires July 2, 1946, and is granted the hon. rank of Lt.-Col.

Lt.-Col. G. G. Keane, *O.B.E.* (15604) on reaching the age for retirement, is retained on the Active List (supern.), Sept. 5, 1946.

Short Service Comms.

Lt. R. Andrew (355536) to be Capt., Sept. 8, 1946.

War Subs. Capt. James Lorimer Fison (250998) from R.A.M.C. (Emerg. Commn.) is granted a Short Service Commn. in the rank of Lt., Nov. 7, 1942 and to be Capt. Nov. 7, 1943.

September 10.—Col. G. D'R. Carr, *M.C.* (4218), late R.A.M.C., having attained the age for retirement, is retained on the Active List (supern.), Sept. 9, 1946.

Royal Army Medical Corps.

War Subs. Lt.-Col. J. V. McNally, M.B. (5826), retires on ret. pay, Aug. 11, 1946, and is granted the hon. rank of Col. (Substituted for the notifi. in *Gazette* (Supplement) dated Aug. 13, 1946.)

The undermentioned War Subs. Maj. to be Maj. :—

Oct. 25, 1944 :—

J. J. Sullivan, M.B. (66521).

Oct. 30, 1945 :—

P. H. Ball (70113).

May 4, 1946 :—

P. Coleman, M.B. (67858).

The undermentioned Capts. to be Majs.,
July 1, 1946 :—

J. A. Manifold (70111).
(War Subs. Maj.) G. B. Heugh (70114).
R. A. Smart, M.B. (70117).
E. W. O. Skinner (70124).
D. G. Levis, M.B. (70125).
J. E. C. Robinson (62546).
K. P. Brown, M.B. (74435).
(War Subs. Maj.) J. C. Watts, M.C. (74438).
E. Gareh (72160).
(War Subs. Maj.) J. McGhie, M.B. (73569).
G. F. Valentine, M.B. (73564).
(War Subs. Maj.) T. M. Fowler, M.B. (73563).
C. McNeil, M.B. (72154).
(War Subs. Maj.) O. W. W. Clarke (72167).
(War Subs. Maj.) G. M. Robertshaw (72162).
B. L. Townsend, M.B. (72163).
(War Subs. Maj.) G. M. Curtois (72156).
W. G. Macfie, M.B. (75591).
M. M. Medine, M.B.E., M.D. (75594).
(War Subs. Maj.) G. K. H. Dunkerton, M.B. M.R.C.P. (73561).
S. Ward (73587).
A. J. N. Warrack, M.B.E., M.B. (73567).
(War Subs. Maj.) D. Matheson, M.B. (73578).
S. F. Cranston (72896).
(War Subs. Maj.) J. C. Barbage, M.B. (75669).
W. Windsor (77058).
W. A. McD. Scott, M.B. (73566).
J. Mackay-Dick, M.B., M.R.C.P. (75585).
J. C. Lambkin, M.B. (73562).
P. D. Stewart, M.B. (73570).
T. A. Pace, O.B.E., M.D. (73585).
S. O. Bramwell, M.B. (73584).
R. A. Bond, M.B. (73586).
W. M. Stewart, M.B. (73590).
D. D. Maitland (73589).
G. F. Edwards, M.B.E., M.B. (78766).
H. C. Jeffrey, M.B. (78767).
F. B. Bagshaw (51996).
H. J. A. Richards, M.B. (75433).
J. B. Plews, M.B. (74434).
T. G. S. James, M.B. (74437).
J. F. D. Murphy, M.B. (85437).
V. J. Keating, M.B. (85434).
T. McEvel, M.B. (75584).
R. M. Hector, M.B. (85411).
A. Crook (78704).
A. W. Box, M.B. (75649).
D. W. Bell, M.B. (75997).
T. G. A. L. Warrington, M.D. (75592).
P. R. Wheatley, D.S.O., M.B. (52033).
R. L. Macpherson, M.B.E., M.B. (89932).
D. A. Ireland, B.M. (78908).
W. J. A. Craig, M.B. (75670).
J. S. F. Watson (78900).

Short Service Commn.

War Subs. Capt. Dermot James Redmond McConvell, M.B. (122469), from R.A.M.C. (Emerg. Commn.) is granted a Short Service Commn. in the rank of Lt., Dec. 10, 1939, and to be Capt., Dec. 10, 1940.

Capt. D. J. R. McConvell, M.B. (122469),

is apptd. to a permanent commn., retaining his present seniority, Dec. 10, 1944.

Capt. O. Jordan (72165) retires, Sept. 8, 1946, and is granted the hon. rank of Maj.

September 12.

September 12.—Awarded M.B.E. for gallant and distinguished services while prisoners of war :—

7257863 Warrant Officer Class II William Latham Bartley, Royal Army Medical Corps.

Captain William Hector McDonald, M.B. (116186), Royal Army Medical Corps.

Major (acting) Thomas Max Pemberton, M.B. F.R.C.S. (175673), Royal Army Medical Corps.

Awarded MENTIONS in recognition of gallant and distinguished services while Prisoners of War :—

Royal Army Medical Corps.

Lt.-Col. St. C. E. Barrett (74454).

Lt.-Col. (temp.) H. C. Benson, M.B. (41285).

Lt.-Col. (temp.) W. G. Harvey (40522).

Lt.-Col. (temp.) E. M. Hennessy, O.B.E., M.B. (41298).

Lt.-Col. (temp.) J. Huston, M.B. (27886).

Lt.-Col. (temp.) J. W. Malcolm, O.B.E., M.C., M.B. (26350).

Lt.-Col. (temp.) J. H. Strahan, M.B. (36587).

Maj. E. A. Smyth, M.B. (70120).

Maj. (temp.) F. E. Anderson, M.B. (98313).

Maj. (temp.) V. Bennett, M.B. (67846).

Maj. (temp.) W. J. E. Phillips, M.B. (75765).

Maj. (actg.) R. C. Burgess, M.B. (221132).

Maj. (actg.) F. L. Webster, M.B., F.R.C.S. (25472).

Capt. (Qr.-Mr.) J. E. Barnett (154197).

Capt. F. E. Butterfield, M.B. (127127).

Capt. P. T. Chopping, M.B. (199114).

Capt. D. Christison, M.B. (163589).

Capt. M. H. Churchill (139699).

Capt. T. R. S. Cormack (133604).

Capt. E. K. Cruickshank, M.B. (133930).

Capt. F. L. K. Daniels, M.B. (111986).

Capt. J. Diver, M.B. (112639).

Capt. J. R. Gibbs, M.B., F.R.C.S. (125005).

Capt. C. Hecht, M.B. (112058).

Capt. J. K. Hewat, M.D. (171525).

Capt. B. Lennox, M.D. (128243).

Capt. C. V. Lewis, M.B. (127630).

Capt. P. MacArthur, M.B. (85441).

Capt. J. McQuillan, M.B. (111764).

Capt. E. R. S. Phillips (101994).

Capt. C. S. Pitt (99108).

Lt. (Qr.-Mr.) F. E. Barber (216564).

7259601 W.O. II (actg.) K. P. J. Hunter (formerly Eckersall).

5877038 S.-Sgt. W. H. Foster.

7260137 S.-Sgt. D. J. Jones.

7261105 S.-Sgt. (actg.) P. G. Musson.

7263015 S.-Sgt. (actg.) H. J. G. Ross.

7261111 S.-Sgt. (actg.) H. R. Wilkinson.

7259185 S.-Sgt. (actg.) E. Wyre.

7261647 Sgt. C. G. Anderson.

7256933 Sgt. J. W. Carter.

7261101 Sgt. H. G. Hayman.

7524160 Sgt. J. Innes.

7524090 Sgt. W. D. Jarrett.

7262346 Sgt. A. Nicholson.
 7349494 Sgt. J. Roberts.
 7262065 Sgt. J. W. Russell.
 7346565 Sgt. (actg.) K. T. Clarkson.
 7262936 Sgt. (actg.) F. W. Ward.
 7262788 Cpl. D. Arthur.
 7372859 Cpl. L. G. Brand.
 7263321 Cpl. J. L. Callaghan.
 7262538 Cpl. N. J. Leath.
 7260063 Cpl. G. Poole.
 6910015 Cpl. G. Wilkins.
 7372900 Lce.-Cpl. F. S. Masson.
 7262679 Lce.-Cpl. E. C. Williams.
 7263656 Pte. F. W. Bennett.
 7383818 Pte. A. Blackhurst.
 7522732 Pte. O. J. Boyle.
 7374110 Pte. C. Bradley.
 7535346 Pte. J. P. Brady.
 7385895 Pte. W. F. Charles.
 7535884 Pte. A. C. Dawson.
 7521330 Pte. F. J. Eade.
 7391833 Pte. J. P. Evans.
 7376321 Pte. F. E. Everett.
 7262906 Pte. F. E. Florence.
 7373583 Pte. A. C. N. Harmer.
 7519593 Pte. D. Harper.
 552456 Pte. C. Harris.
 7516422 Pte. C. E. Harrison.
 7374179 Pte. R. Hartley.
 7395042 Pte. F. Hattrick.
 2568333 Pte. S. J. Howe.
 7535721 Pte. V. Nelson.
 7373276 Pte. R. H. Newman.
 7532566 Pte. M. R. Nicholas.
 7374045 Pte. A. Riley.
 7263494 Pte. L. Starkey.
 7523548 Pte. G. Swingewood.
 7263375 Pte. T. Varty.

REGULAR ARMY.

Col. R. K. Mallam, *O.B.E.*, M.B. (8027), late R.A.M.C., to retire on ret. pay, Sept. 11, 1946, and to be granted the hon. rank of Brig.

Col. A. A. M. Davies (4860) late R.A.M.C. to retire on ret. pay, Sept. 11, 1946, and to be granted the hon. rank of Brig.

Royal Army Medical Corps.

Lt.-Col. J. H. C. Walker, M.B. (8449) to be Colonel, Sept. 9, 1946, with seniority Mar. 26, 1945.

Maj. T. M. Corcoran (47425) to be Lt.-Col., Sept. 5, 1946.

Maj. (War subn. Lt.-Col.) W. A. Y. Knight, M.B. (45043) to be Lt.-Col., Sept. 9, 1946.

September 17.

Col. F. G. Flood, *M.C.*, M.B. (8607), late R.A.M.C., on completion of four years in the rank, is retained on the active list (Supern.), Sept. 16, 1946.

Lt.-Col. W. W. S. Sharpe (5820) from R.A.M.C. to be Col., Sept. 16, 1946, with seniority Apr. 25, 1945.

The date of seniority of the promotion to Col. of Lt.-Col. T. H. Sarsfield, *O.B.E.* (15326), R.A.M.C., is Feb. 15, 1945, and not as notified in *Gazette* (Supplement) dated Aug. 16, 1946.

The initials of Maj. M. F. Kelleher, *M.C.*,

M.B. (67854), are as now described and not as notified in *Gazette* (Supplement) dated Apr. 26, 1946.

Short Service Commn. Specialist.

Lt. (War Subs. Capt.) I. F. Fraser, M.D., M.R.C.P. (274674), from R.A.M.C. (E.C.) to be Capt., Aug. 29, 1946.

War Office, September 19, 1946.

The KING has been graciously pleased to approve the following awards in recognition of gallant and distinguished services in the field (to be dated November 23, 1944) :—

The Military Medal.

No. 7264507 Sergeant (acting) Ronald George Morris, *B.E.M.*, Royal Army Medical Corps.

War Office, September 19, 1946.

The KING has been graciously pleased to approve that the following be Mentioned in recognition of gallant and distinguished services in Burma :—

Royal Army Medical Corps.

Brig. (temp.) J. P. MacNamara, M.B. (5347).
 Brig. (actg.) R. R. Bomford, M.D., M.R.C.P. (127126).

Brig. (lce.) P. Wiles, M.S., F.R.C.S. (227866).
 Col. (temp.) R. A. Anderson, *O.B.E.*, M.B., F.R.F.P.S. (26294).

Col. (temp.) J. D. Driberg, F.R.C.S. (122027).
 Col. (temp.) P. J. Stokes, *T.D.*, M.B. (30060).
 Col. (actg.) A. B. Dempsey (66501).

Col. (actg.) R. R. Leaning, *O.B.E.* (41300).
 Lt.-Col. P. H. R. Anderson, M.B. (34678).
 Lt.-Col. A. J. Dalzell-Ward (115564).

Lt.-Col. (temp.) G. T. Ashley, M.B. (135268).
 Lt.-Col. (temp.) H. L. Ellis (107220).
 Lt.-Col. (temp.) G. J. Evans, M.B. (163705).

Lt.-Col. (temp.) P. P. Fox, M.B. (178405).
 Lt.-Col. (temp.) W. R. N. Friel, M.B. (125030).
 Lt.-Col. (temp.) W. G. Garrow, M.B. (53171).

Lt.-Col. (temp.) W. H. Graham, M.B., F.R.C.S. (225716).
 Lt.-Col. (temp.) K. H. Harper (67855).

Lt.-Col. (temp.) G. C. Hernan, M.B. (119730).
 Lt.-Col. (temp.) M. S. Holman, M.B. (71898).
 Lt.-Col. (temp.) C. H. Hoskyn, *O.B.E.* (122017).

Lt.-Col. (temp.) R. H. Isaac (159929).
 Lt.-Col. (temp.) K. Kumar, M.B. (163372).
 Lt.-Col. (temp.) D. A. Lowe, M.B. (77845).

Lt.-Col. (temp.) G. G. Mer, *O.B.E.* (227124).
 Lt.-Col. (temp.) R. S. Ogborn, M.D., M.R.C.P. (199112).

Lt.-Col. (temp.) R. A. Philp, M.B. (125020).
 Lt.-Col. (temp.) R. K. Pilcher, *M.C.* (100999).
 Lt.-Col. (temp.) J. R. Squire, M.B., M.R.C.P. (236276).

Lt.-Col. (temp.) H. Stevenson, M.B. (87929).
 Lt.-Col. (temp.) J. C. Watts, *M.C.* (74438).
 Lt.-Col. (temp.) A. L. Wilson, M.B. (115108).

Lt.-Col. (actg.) I. Calvert-Wilson, M.B. (181726).
 Lt.-Col. (actg.) T. K. Howat, M.B. (128380).
 Lt.-Col. (actg.) H. L. Wolfe (85412).

Maj. (temp.) A. M. Hutton (202263).
 Maj. (temp.) J. C. Coates, M.B., F.R.C.S. (205595).

Maj. (temp.) A. Colbert, M.B. (102596).
 Maj. (temp.) J. O. Collin, M.B. (161269).

- Maj. (temp.) H. W. F. Croft, M.B. (250365).
 Maj. (temp.) J. P. Donnel, M.B. (227594).
 Maj. (temp.) H. F. Ferguson, M.B. (69760).
 Maj. (temp.) A. Gould, M.B. (110674).
 Maj. (temp.) E. J. Harrison, M.B. (254103).
 Maj. (temp.) R. G. Henderson, M.B., F.R.C.S. (301960).
 Maj. (temp.) J. Hemphill, M.B. (241360).
 Maj. (temp.) N. Leitch, M.B. (135687).
 Maj. (temp.) P. F. McGuire, M.B. (195829).
 Maj. (temp.) A. L. R. Mayer, M.B. (185304).
 Maj. (temp.) A. I. McCallum, M.B. (133489).
 Maj. (temp.) J. A. McPherson (309425).
 Maj. (temp.) R. Murray (202519).
 Maj. (temp.) J. O'Hara (238415).
 Maj. (temp.) N. C. Porter, M.B. (211845).
 Maj. (temp.) J. A. Ritchie, M.B. (199338).
 Maj. (temp.) (Qr.-Mr.) F. Stephenson (297573).
 Maj. (temp.) W. T. Walker, M.B.E., M.B. (218962).
 Maj. (temp.) G. Wynne-Griffith, M.B. (263718).
 Maj. (actg.) K. T. Grey, M.B. (230083).
 Maj. (actg.) J. W. Miller, M.B. (248057).
 Maj. (actg.) W. G. Mills, M.B. (116417).
 Capt. R. M. Allan, M.B. (279349).
 Capt. R. F. Antonio, M.B. (248220).
 Capt. G. D. G. Barnes (318376).
 Capt. R. H. Bowie, M.B. (250645).
 Capt. E. G. Dryburgh, M.B. (254627).
 Capt. R. C. Evans, B.M. (291111).
 Capt. J. A. S. Forman (250629).
 Capt. C. R. Forrest, M.B. (279343).
 Capt. P. Fuchs (274415).
 Capt. J. C. Heslith, M.B. (274144).
 Capt. K. Heslop (318692).
 Capt. L. P. Hodgson (112072).
 Capt. N. B. Jones, M.B. (231722).
 Capt. S. H. Madden, M.B. (159530).
 Capt. W. D. Mail (221905).
 Capt. P. L. Masters, M.B. (309196).
 Capt. S. J. T. Merryfield (270899).
 Capt. C. E. S. Myers, M.B.E. (181725).
 Capt. B. A. Protheroe (195115).
 Capt. (Qr.-Mr.) S. G. Quain (294593).
 Capt. I. Reubin, M.B. (205937).
 Capt. A. C. Ritchie, M.B. (270452).
 Capt. P. R. Robinson (317426).
 Capt. (Qr.-Mr.) E. Taylor (223233).
 Capt. K. R. Urquhart, M.B. (195117).
 Capt. J. A. K. Wallace, M.B. (266539).
 Capt. G. L. Whitmore (241378).
 Capt. (temp.) K. W. Andrews (303422).
 Capt. (temp.) J. W. Hitchens (313192).
 Capt. (temp.) F. H. Kelland (325680).
 Capt. (temp.) G. W. Park, M.B. (291124).
 Capt. (temp.) D. H. Rea (328701).
 Capt. (temp.) A. Smith (328033).
 Capt. (temp.) R. B. C. Smith (309441).
 Capt. (temp.) M. W. Stock (339093).
 Capt. (temp.) W. T. Stone (313200).
 Capt. (Qr.-Mr.) (temp.) E. C. C. Wyer (313438).
 Capt. (actg.) S. D. Cuthbertson (342147).
 Capt. (actg.) A. Harrop (326509).
 Capt. (actg.) A. T. Makin (322143).
 Lt. F. Birch (317416).
 Lt. (Qr.-Mr.) A. Cummings (328932).
 Lt. A. E. Davies (313688).
 Lt. H. Harris (274223).
 Lt. A. I. Hyman (322766).
 Lt. D. I. Jones (303425).
 Lt. (Qr.-Mr.) M. T. Kifford (294596).
 Lt. J. W. Lewis (328076).
 Lt. G. F. Strickett (301755).
 7524055 W.O. I C. A. Brown.
 7379113 W.O. I D. H. Dartnall.
 7519069 W.O. I K. L. Exley.
 7518852 W.O. I J. D. Marlow.
 7259172 W.O. I T. V. Shorters.
 7522168 W.O. I W. Simpson.
 7400389 W.O. I G. B. Somerset.
 14245123 W.O. I (actg.) W. F. B. Abbott.
 7262245 W.O. I (actg.) W. Crighton.
 7349779 W.O. I (actg.) C. Hayward.
 7360023 W.O. I (actg.) E. Moore.
 7357464 W.O. I (actg.) T. C. Stiff.
 7373302 W.O. I (actg.) C. G. Stuckey.
 7382764 W.O. I (actg.) R. J. Sutton.
 7389387 W.O. II H. A. Boxshall.
 7263330 W.O. II H. T. Gay.
 7393098 W.O. II F. C. Hall.
 737009 W.O. II G. H. Hutchinson.
 7349172 W.O. II G. A. Mortimore.
 7345342 W.O. II D. H. Penny.
 7395560 W.O. II A. Smith.
 7522322 W.O. II G. West.
 7373359 W.O. II (actg.) A. Holland.
 7345030 W.O. II (actg.) J. E. Joyce.
 7533435 W.O. II (actg.) J. H. A. Lobo.
 7389231 W.O. II (actg.) E. W. Morris.
 7368469 S.-Sgt. W. A. Birch.
 7376800 S.-Sgt. T. Calder.
 7347182 S.-Sgt. T. W. Chapman.
 7524077 C.Q.M.S. H. Fine.
 7941692 S.-Sgt. A. D. Milton.
 7344809 S.-Sgt. A. M. D. Pudsey.
 7348768 S.-Sgt. H. S. H. Roberts.
 7366831 S.-Sgt. R. Wilson.
 7390389 S.-Sgt. (actg.) L. O. Hammond.
 4929028 S.-Sgt. (actg.) L. Turner.
 7382793 Sgt. W. J. Ashwell.
 7360671 Sgt. G. Butler.
 7377663 Sgt. C. G. Chatfield.
 10556986 Sgt. W. Dobbs.
 7378255 Sgt. G. Elwood.
 7521000 Sgt. J. H. Emmott.
 14520909 Sgt. D. Evans.
 14601610 Sgt. P. J. Flemming.
 7358405 Sgt. R. R. Griffiths.
 14336633 Sgt. W. E. Groves.
 7391211 Sgt. K. J. Hake.
 112677138 Sgt. A. T. Hopkins.
 7384701 Sgt. J. K. Jackson.
 7403834 Sgt. M. A. Jones.
 7349982 Sgt. R. King.
 7537957 Sgt. C. Maslin.
 14545365 Sgt. H. O'Dell.
 7378048 Sgt. P. O'Malley.
 7535414 Sgt. L. G. Parker.
 7537663 Sgt. H. Rick.
 7373966 Sgt. R. Smith.
 7403038 Sgt. E. D. Trevillion.
 7377968 Sgt. F. M. Watson.
 7396524 Sgt. (actg.) T. E. Cox.
 7403374 Sgt. (actg.) C. A. McLeod.
 7376722 Sgt. (actg.) J. Wood.
 7392745 Lce.-Sgt. J. Orcott.
 7525164 Cpl. E. Reilly.
 14549003 Cpl. I. Simions.

1360258 Cpl. A. H. Smith.
 7534313 Cpl. H. T. Steinherr.
 7373381 Cpl. J. M. Todd.
 14230764 Cpl. J. T. Tooley.
 7387180 Lce.-Cpl. W. Aspery.
 7533374 Lce.-Cpl. E. Duffield.
 14551738 Lce.-Cpl. R. W. Fisher.
 7534251 Lce.-Cpl. H. Maclure.
 7377280 Lce.-Cpl. G. March.
 14333324 Lce.-Cpl. A. Turner.
 7534415 Pte. H. G. T. Carpenter.
 14248761 Pte. H. F. Cornell.
 14708538 Pte. E. A. Genge.
 7372777 Pte. R. V. Haynes.
 14619344 Pte. T. Ledbrook.
 14519855 Pte. T. C. Vincent.
 7534677 Pte. D. Webb.

September 20.—Col. J. B. Fotheringham, M.B. (5165), late R.A.M.C., retires on ret. pay, on account of disability, Sept. 2, 1946.

Maj. C. J. Blaikie (14909) ret. pay, re-employed, is restored to the rank of Lt.-Col. on ceasing to be re-employed, Sept. 7, 1945, and is granted the hon. rank of Col.

Short Service Comms.

War Subs. Maj. David William Davies

(92449) from R.A.M.C. (T.A.) to be Lt., Sept. 2, 1939, and to be Capt., Sept 2, 1940.

Capt. (War Subs. Maj.) D. W. Davies (92449) is apptd. to a permanent commn., Sept 2, 1944, retaining his present seniority.

Specialist.

War Subs. Capt. J. L. Huggan, M.B. (313327), from R.A.M.C. (E.C.), to be Capt., Aug. 29, 1946.

September 24.—

Short Service Comms.

War Subs. Capt. Donald Gill (274669) from R.A.M.C. (E.C.) to be Lt., May 8, 1943, and to be Capt., May 8, 1944.

Capt. (War Subs. Maj.) M. Kosloff (65310) retires Sept. 21, 1946, and is granted the hon. rank of Lt.-Col.

September 27.—Capt. A. B. Fountain (85435) to be Maj., Aug. 1, 1946.

Short Service Commn.

Capt. E. M. Ensor (205568) is apptd. to a permanent commn., Sept 27, 1946, retaining his present seniority.

DEATHS.

CLARKSON.—On Dec. 9, 1945, Lieutenant-Colonel Thomas Harry Frederick Clarkson, R.A.M.C. Retired. Born in Auckland, New Zealand, June 10, 1864, he took the M.R.C.S., England, in 1885 and the L.R.C.P. London, in 1886, and was commissioned Surgeon July 28, 1886. Promoted Major, R.A.M.C., July 28, 1898, and Lieutenant-Colonel July 28, 1906, he retired July 29, 1911. He was re-employed from Aug. 3, 1914, till Sept. 18, 1919, being brought to notice for valuable services in Communique of Sept. 18, 1917. He served on the Nile in 1898, being present at the battle of Khartoum and receiving the Khedive's Medal with Clasp and the Medal.

HEALE.—On Aug. 9, 1946, Colonel Arthur Stanley Heale, M.C., late R.A.M.C. Born July 5, 1887, he took the L.R.C.P., London, and the M.R.C.S., England, in 1910, and was appointed Lieutenant, R.A.M.C., July 28, 1911. He was promoted Captain, Jan. 28, 1915, Major, July 28, 1923, Lieutenant-Colonel, May 1, 1934, and Colonel, April 14, 1939. He served in East Africa from Oct., 1914, till Oct., 1917, being awarded the M.C., 1914-15 Star, British War and Victory

Medals. He served in Malta and the Middle East in 1942 and 1943, proceeding to India in the latter year.

CAMPBELL.—In Sheffield on Aug. 29, 1946, Lieutenant-Colonel John Hay Campbell, C.B.E., D.S.O., R.A.M.C. Retired. Born Dec. 31, 1871, he took the L.S.A. in 1893 and the M.R.C.S., L.R.C.P., London, in 1894, and was appointed Surgeon Lieutenant July 29, 1895. Promoted Captain, R.A.M.C. July 29, 1898, Major Jan. 29, 1907, and Lieutenant-Colonel March 1, 1915, he retired Nov. 13, 1920. In the South African War he took part in the operations in Natal, 1899; the Relief of Ladysmith, including actions at Spion Kop, Vaal Kranz, and on Tugela Heights (Feb. 14 to 27, 1900), where he was severely wounded on Feb. 24, and in the operations in the Transvaal. Twice mentioned in despatches, he was awarded the D.S.O. and the Queen's Medal with three Clasps. He served in France from Aug. 26, 1914, till Nov., 1919, being twice mentioned in despatches, created C.B.E. and awarded the 1914 Star, British War and Victory Medals.

JOURNAL OF THE ROYAL ARMY MEDICAL CORPS

Corps News.

OCTOBER, 1946.

FROM THE "LONDON GAZETTE."

October 1.

Royal Army Medical Corps.

Maj. W. D. C. Kelly, *D.S.O.*, *M.C.* (1982), is restored to the rank of Col., Aug. 13, 1946, on ceasing to be re-employed.

Lt.-Col. J. McFadden, *M.B.* (5304), retired on ret. pay, Sept. 28, 1946, and is granted the hon. rank of Col.

Short Service Commn.

War Subs. Maj. J. C. A. Marchand, *M.D.* (68238), retired on account of disability, Aug. 29, 1946, and is granted the hon. rank of Lt.-Col.

REGULAR ARMY RESERVE OF OFFICERS.

Royal Army Medical Corps.

Lt.-Col. C. Helm, *D.S.O.*, *O.B.E.*, *M.C.* (36273), having exceeded the age limit, ceases to belong to the Res. of Offrs., Aug. 7, 1946, and is granted the hon. rank of Col. (Substituted for the notifn. in *Gazette* (Supplement) dated Aug. 9, 1946.)

October 4.

Royal Army Medical Corps.

Maj. E. J. Curran, *M. B.* (41367), to be Lieut.-Col., Sept. 5, 1946.

Capt. W. J. A. Craig, *M.B.* (75670), to be Maj., July 1, 1946.

Lt.-Col. L. M. Rowlette, *D.S.O.*, *M.C.* (15764), retires on ret. pay, Oct. 3, 1946, and is granted the hon. rank of Col.

Short Service Commn. (Specialist).

Capt. Donald Emile Solomon Steele (223764), from *R.A.M.C.* (Regs. *S.S. Commn.*) is granted a short service (Specialist) Commn. in the rank of Capt., Sept. 10, 1946.

October 8.

Royal Army Medical Corps.

Short Service Commn.

War Subs. Capt William Scrymgour Rhodes, *M.B.* (246215), from *R.A.M.C.* (*E.C.*), to be Lt., Sept. 12, 1946 and to be Capt., Sept. 12, 1943.

October 11.

Short Service Commns.

War Subs. Capt. Hamilton James Elverson, *B.M.* (246792), from *R.A.M.C.* (*E.C.*), to be Lt., Sept. 26, 1942 and to be Capt., Sept. 26, 1943.

Specialist.

Lt. (War Subs. Capt.) C. F. Perry, *M.B.* (171519), from *R.A.M.C.* (*E.C.*) to be Capt., Sept. 19, 1946.

The Army Dental Corps.

Short Service Commn.

Capt. D. H. Small (128128) to be appt. to a permanent commn., May 14, 1946, retaining his present seniority.

October 15.

Royal Army Medical Corps.

Maj. (War Subs. Lt.-Col.) W. A. Y. Knight, *M.B.* (45043), to be Lt.-Col., Sept. 16, 1946. (Substituted for the notifn. in *Gazette* (Supplement) dated Sept. 13, 1946.)

Capt. (Qr.-Mr.) W. H. E. Hill (76706) to be Maj. (Qr.-Mr.), Oct. 13, 1946.

October 17.—The King has been pleased to grant unrestricted permission for the wearing of the following decorations which have been conferred on the undermentioned personnel in recognition of distinguished services in the cause of the Allies:—

DECORATIONS CONFERRED BY THE PRESIDENT OF THE UNITED STATES OF AMERICA.

Legion of Merit, Degree of Commander.

Brigadier (temporary) Hugh Llewelyn Glyn Hughes, *C.B.E.*, *D.S.O.*, *M.C.* (111060), *Royal Army Medical Corps.*

Legion of Merit, Degree of Officer.

Lieutenant-Colonel Arthur Noel Birchill Odbert, *O.B.E.*, *M.B.* (42438), *Royal Army Medical Corps.*

The Legion of Merit, Degree of Legionnaire.

Colonel Thomas Young, *O.B.E.*, *M.B.* (10380), *Royal Army Medical Corps.*

Silver Star Medal.

Lieutenant John Desmond Devitt (287584), *Royal Army Medical Corps.*

Bronze Star Medal.

Brigadier (temporary) Myles Landseer Formby, *M.B.*, *F.R.C.S.* (56473), *Royal Army Medical Corps.*

Captain Thomas Watts Renton (252435), *Royal Army Medical Corps.*

Lieutenant James Gordon Searle (268407), *Royal Army Medical Corps.*

No. 7257334 Warrant Officer Class I Frederick Walter Webb, Royal Army Medical Corps.

No. 7347465 Warrant Officer Class II Royal Gower, Royal Army Medical Corps.

No. 7370360 Private Raoul Basil Duthie, Royal Army Medical Corps.

Typhus Commission Medal.

Brigadier Rudolf William Galloway, C.B., C.B.E., D.S.O., M.B. (5839), Royal Army Medical Corps.

Brigadier George Singleton Parkinson (8141), Royal Army Medical Corps.

Colonel (acting) Herbert Davis Chalke, O.B.E. (87094), Royal Army Medical Corps.

DECORATION CONFERRED BY HIS ROYAL HIGHNESS THE PRINCE REGENT OF BELGIUM.

Commander of the Order of the Crown.

Major-General Edward Phillips, K.B.E., C.B., D.S.O., M.C., M.B. (8555), late Royal Army Medical Corps.

DECORATIONS CONFERRED BY HER MAJESTY, THE QUEEN OF THE NETHERLANDS.

Knight Officer of the Order of Orange Nassau with Swords.

Major George Field Bramley, M.D. (324058), Royal Army Medical Corps.

Major (temporary) Harold Kennedy, M.B.E., M.B. (181812), Royal Army Medical Corps.

October 18.

Royal Army Medical Corps.

Col. F. S. Gillespie, M.D. (8651), late R.A.M.C., having attained the age for retirement, is retained on the Active List (supern.), Oct. 19, 1946.

Maj. T. M. Corcoran (47425), to be Lt.-Col., Sept. 9, 1946. (Substituted for the notifi. in *Gazette* (Supplement) dated Sept. 13, 1946.)

Short Service Commn. (Specialist).

War Subs. Capt. W. P. Lee, M.B. (262723) from R.A.M.C. (Emerg. Commn.) to be Capt., Sept. 26, 1946.

The Army Dental Corps.

Capt. H. D. Freeman (90114) to be Maj., Oct. 17, 1946.

October 22.

War Office, October 22, 1946.

REGULAR ARMY.

Col. H. C. D. Rankin, C.I.E., O.B.E., M.B. (8129), late R.A.M.C., retires on ret. pay, Oct. 22, 1946, and is granted the hon. rank of Maj.-Gen.

Royal Army Medical Corps.

The undermentioned to be Majs. :—

July 1, 1946 :—

Capt. (War Subs. Lt.-Col.) J. B. Bunting (72157).

Sept. 4, 1946 :—

Capt. J. A. Allen, M.B. (100136).

Maj. (War Subs. Lt.-Col.) A. D. Bourne (52191) retires and receives a gratuity, Oct. 24, 1946, and is granted the hon. rank of Col.

Short Service Commns.

Capt. (War Subs. Lt.-Col.) J. B. Bunting (72157) to be apptd. to a permanent commn., Apr. 23, 1942, retaining his present seniority.

Capt. A. J. Moss-Blundell, M.B. (211583), is apptd. to a permanent commn., Oct. 18, 1946, retaining his present seniority. October 25.

REGULAR ARMY.

Lt.-Col. R. S. Dickie, M.B. (15779), from R.A.M.C. to be Col., Oct. 19, 1946, with seniority, Apr. 30, 1945.

Lt.-Col. R. M. King (15734), late A.D. Corps, is restored to the rank of Col., Sept. 2, 1945, on ceasing to be employed.

Royal Army Medical Corps.

Maj. D. P. F. Mulvany (49703) to be Lt.-Col., Oct. 19, 1946.

The undermentioned to be Majs. :—

July 1, 1946 :—

Capt. (War Subs. Maj.) F. B. Bagshaw (51996).

Sept. 1, 1946.

Capt. G. E. Gray, M.B. (66506).

REGULAR ARMY RESERVE OF OFFICERS.

General List.

Col. C. M. Finny, O.B.E., M.B., F.R.C.S. (8132), late R.A.M.C., is restored to the rank of Maj.-Gen., Oct. 26, 1946, on ceasing to be employed.

October 29.

REGULAR ARMY.

Lt.-Col. A. R. Oram, O.B.E., M.C., M.B. (15691), from R.A.M.C., to be Col., Oct. 29, 1946, with seniority May 14, 1945.

Col. R. H. Alexander, M.C., M.B. (15689), late R.A.M.C., on completion of four years in the rank is retained on the Active List (supern.), Oct. 29, 1946.

Royal Army Medical Corps.

Maj. (War Subs. Lt.-Col.) C. S. Gross, M.B., F.R.C.S. (Edin. (47492), to be Lt.-Col., Oct. 29, 1946.

Lt.-Col. J. M. MacKenzie, C.B.E., M.C., M.B. (14371), is Seconded for Service, Aug. 20, 1946.

Capt. (Qr.-Mr.) J. W. Price, M.B.E. (95419), to be Maj. (Qr.-Mr.), Oct. 29, 1946.

Short Service Commns.

War Subs. Capt. Owen Griffith Jones (328834) from R.A.M.C. (E.C.) is granted a Short Service Commn. in the rank of Lt., Aug. 26, 1944, and to be Capt., Aug. 26, 1945.

War Subs. Capt. George Murdoch McEwan, M.B. (342069), from R.A.M.C. (E.C.) is granted a Short Service Commn. in the rank of Lt., Feb. 10, 1945, and to be Capt., Feb. 10, 1946.

Maj. G. B. F. Churchill (11094), ret. pay, R.A.M.C., is restored to the rank of Lt.-Col., on ceasing to be employed, Sept. 12, 1946.

Maj. A. E. B. Jones, M.D. (11027), ret. pay, R.A.M.C., is restored to the rank of Lt.-Col. on ceasing to be employed, Oct. 3, 1946.

Capt. I. D. Paterson, M.B. (99318), h.p. list, late R.A.M.C., retires on ret. pay on account of disability, Oct. 28, 1946, and is granted the hon. rank of Maj.

DEATHS.

SUTTON.—At her home, Erin, Woburn Sands, Bucks, on Oct. 13, 1946, Miss Madge Sutton late Q.A.I.M.N.S. (R). She served in France, from 1915 to 1919, was mentioned in despatches and awarded the 1914-15 Star, the British War Medal and the Victory Medal.

HOUGHTON.—In Farnham Royal, Bucks, on Nov. 7, 1946, Colonel George John Houghton, *D.S.O.*, late R.A.M.C., Retired. He was born in Rathmines, Co. Dublin, on Sept. 20, 1873 and commissioned Lieutenant, R.A.M.C., April 25, 1900. Promoted Captain April 25, 1903, Major Jan. 25, 1912, and Lieutenant-Colonel Dec. 26, 1917, he retired with the rank of Colonel Sept 20, 1928. He took part in the operations in the Transvaal and Orange River Colony in 1901 and 1902, being awarded the Queen's Medal with five Clasps. He served in France from May 14, 1915 till April 14, 1919. Twice mentioned in despatches, he was awarded the *D.S.O.*, Belgian War Cross, 1914-15 Star, British War and Victory Medals. He again saw service in Mesopotamia in 1919 and 1920, receiving the Medal with Clasp.

SLAYTER.—On Aug. 22, 1946, Colonel Edward Wheeler Slayter, *C.M.G.*, *D.S.O.*, late R.A.M.C., Retired. Son of the late Dr. W. B. Slayter of Halifax, Nova Scotia, he was born there Jan. 15, 1869. Educated at Dalhousie College, Nova Scotia, in Germany and at Edinburgh, he graduated M.B. at the last named in 1891, and entered the Army as Surgeon Lieutenant on July 27, 1892. Promoted Surgeon Captain July 27, 1895, Major R.A.M.C. July 27, 1904, Lieutenant-Colonel Dec. 31, 1914 and Colonel Dec. 26, 1917, he retired Dec. 26, 1921. For a time in 1924 he held the Retired Pay appointment at Scarborough. He served on the North West Frontier of India in 1897-1898, receiving the Medal with Clasp. In South Africa 1899-1900, he took part in the operations in Natal in 1899 including actions at Elandslaagte, Rietfontein, and Lombard's Kop and the defence of Ladysmith, being

awarded the Queen's Medal with two Clasps. He served in France from Aug. 18, 1914 till Aug. 4, 1919. Six times mentioned in despatches, he was created *C.M.G.*, and received the *D.S.O.*, 1914 Star and Clasp, British War and Victory Medals.

THOMPSON.—On Oct. 2, 1946 in St. Thomas's Hospital Lieutenant-Colonel Richard James Campbell Thompson, *C.M.G.*, *D.S.O.*, M.D., M.R.C.P., R.A.M.C., Retired. Born Aug. 1, 1880, he was commissioned Lieutenant R.A.M.C. Jan. 31, 1905. He was promoted Captain July 31, 1908 and seconded for service with the Egyptian Army from April 29, 1910 till Dec. 11, 1913, and was a member of the Sudan Sleeping Sickness Commission 1910-1913. He received the 4th Class Medjidieh in 1913. He was promoted Major Oct. 15, 1915 and retired on account of ill-health with the rank of Lieutenant-Colonel Aug. 2, 1922. He was Physician and Surgeon, Royal Hospital, Chelsea, Jan. 23, 1919 till Aug. 1, 1922. After retirement he was appointed secretary of St. Thomas's Hospital Medical School. He served in France from Aug. 20, 1914 till July 17, 1919. Thrice mentioned in despatches, he was created *C.M.G.* and received the *D.S.O.*, 1914 Star, British War and Victory Medals.

A friend writes :—

Thompson was not a man who could suffer fools gladly nor could he be all things to all men. If, at times, he seemed positively rude—this was merely a façade, and those who knew him best realized that he had a heart of gold and will remember his many acts of unobtrusive kindness.

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JOURNAL OF THE ROYAL ARMY MEDICAL CORPS

Corps News.

NOVEMBER, 1946.

FROM THE "LONDON GAZETTE."

November 1.

Regular Army.

Lt.-Col. G. D. Gripper, M.B. (15701) from R.A.M.C. to be Col., 30th Oct. 1946, with seniority from 29th June 1945.

Royal Army Medical Corps.

Maj. J. B. George, M.B. (52438) to be Lt.-Col. 30th Oct. 1946.

The undermentioned to be Maj.s., 1st Nov. 1946 :—

War Subs. Lt.-Col. J. B. M. Milne, *O.B.E.*, M.B. (78906).

Capt. R. D. Bell, M.B. (78703).

Capt. G. L. Humphreys (78768).

Capt. F. J. Ingham, B.M. (78910).

Lt. (Qr.-Mr.) (War Subs. Capt. (Qr.-Mr.)) Alfred William Grevatt (187687) from Emerg. Comm., to be Lt. (Qr.-Mr.), 13th Oct. 1946.

Lt. (Qr.-Mr.) A. W. Grevatt (107687) to be Capt. (Qr.-Mr.), 13th Oct. 1946.

November 5.

Royal Army Medical Corps.

War Subs. Maj. R. G. Davies (78637) to be Maj., 1st Nov. 1946.

War Subs. Maj. A. L. J. Webb (78705) to be Maj., 1st Nov. 1946.

Lt.-Col. H. A. Ferguson, M.B. (38182), retires and receives a gratuity, 3rd Nov. 1946, and is granted the hon. rank of Col.

Lt.-Col. C. F. Anthonisz (15653) retires on ret. pay, 4th Nov. 1946, and is granted the hon. rank of Col.

November 8.

Regular Army.

Maj.-Gen. Sir E. W. C. Bradfield, *K.C.I.E.*, *O.B.E.*, M.B., M.S. (London), F.R.C.S., is granted the hon. rank of Lt.-Gen., 29th July 1946.

Royal Army Medical Corps.

Capt. H. J. Anderson, M.B. (73573), to be Maj., 8th Oct. 1946, with seniority next below Maj. P. Coleman.

Capt. D. M. Macdonald (75596) retires on account of disability, 3rd Oct. 1946, and is granted the hon. rank of Maj.

Short Service Commn.

Capt. H. J. Anderson, M.B. (73573), to be apptd. to a permanent commn., 22nd Oct. 1941, retaining his present seniority.

November 12.

Regular Army.

Col. D. G. Cheyne, *C.B.E.*, *M.C.*, M.D. (14491) (R.A.M.C.) having reached the age for retirement, is retained on the Active List supern., 30th Oct. 1946.

Royal Army Medical Corps.

Capt. E. D. H. Williams, M.B. (73571), to be Maj., 16th Oct. 1946, with seniority next below Maj. T. A. Pace.

Maj. C. McQueen (957) on ceasing to be employed on account of disability, reverts to ret. pay, 10th Nov. 1946, and is restored to the rank of Lt.-Col.

Lt.-Col. R. M. Davies (8536) ret. re-empld., reverts to ret. pay on account of disability, 13th Nov. 1946.

Short Service Commns.

Capt. E. D. H. Williams, M.B. (73571), to be appt. to a permanent commn., 22nd Oct. 1942, retaining his present seniority.

War Subs. Capt. Ian Murray Grant, M.B. (306775), from R.A.M.C. (T.A.) is granted a Short Service Commn. in the rank of Lt., 28th July 1945, and to be Capt., 28th July 1946.

November 14.

MENTIONED IN DESPATCHES (Field).

Capt. J. H. Annan, M.B. (131349) R.A.M.C.

Capt. G. McL. Gorrie, M.B. (107745).

November 15

Royal Army Medical Corps.

War Subs. Maj. N. Bickford (72166) to be Maj., 1st July 1946.

Short Service Commn.

War Subs. Maj. Desmond Gilbert Cromie Whyte, *D.S.O.*, M.B. (101008), from R.A.M.C. (E.C.) to be granted a Short Service Commn. in the rank of Lt., 14th Oct. 1939, and to be Capt., 14th Oct. 1940.

The undermentioned are apptd. to permanent commns., retaining their present seniority: 23rd Apr. 1942 :—

War Subs. Maj. N. Bickford (72166).

1st May 1944 :—

Capt. H. J. McCann, M.B. (89979).

7th July 1944 :—

Capt. A. R. T. Lundie, M.B. (94926).

14th Oct. 1944 :—

War Subs. Maj. D. G. C. Whyte, *D.S.O.*,
M.B. (101008).

8th Nov. 1946 :—

Capt. H. M. Macfie, *M.C.*, M.B. (216202).

War Subs. Maj. C. H. George, *M.C.*, M.D. (65888), retires, 26th Oct. 1946, and is granted the hon. rank of Maj.

November 14.

The Army Dental Corps.

Maj. J. W. Vasey, *M.C.* (35393), retires on account of disability, 14th Jan. 1946, and is granted the hon. rank of Lt.-Col. (Substituted for the notfn. in *Gazette* (Supplement) dated 29th Jan. 1946.)

November 19.

Royal Army Medical Corps.

Short Service Commn.

War Subs. Capt. Abraham Seftel Beare, M.B. (116925), from R.A.M.C. (E.C.), is granted a commn. in the rank of Lt., 19th Jan. 1940, and to be Capt., 19th Jan. 1941.

November 22.

Royal Army Medical Corps.

Short Service Commn.

War Subs. Capt. Augustus Warren Merrick, M.B. (96016), from R.A.M.C. (I.A.) to be Lt., 29th Jan. 1944 and to be Capt., 29th Jan. 1945.

Short Service.

Specialist Commn.

Lt. Lewis Mackie, M.B. (358783), from R.A.M.C. (E.C.) to be Lt., 31st Oct. 1946.

November 26.

Royal Army Medical Corps.

Capt. A. Bennett (53971) to be Maj., 1st Nov. 1946.

Lt.-Col. C. Wilson, M.B. (5377), having attained the age for retirement, is retained on the Active List (supern.), 26th Nov. 1946.

Lt.-Col. G. B. Hadden (10416) retires on ret. pay, 26th Nov. 1946, and is granted the hon. rank of Col.

November 28.

BRITISH EMPIRE MEDAL (Military Division)

In recognition of valuable services rendered by the undermentioned repatriated prisoners of war during their captivity :—

No. 7359202 Pte. David Hubert Donnelly.

No. 7373562 Cpl. Thomas Sidney Leonard Edwards.

No. 841064 Cpl. Walter Henry Claude Fuller.

No. 7374175 Pte. Jack Green.

No. 7524159 Sjt. Joseph Harper.

No. 7347122 Sjt. George Edward Holton.

No. 7258669 Sjt. Henry George Hughes.

No. 7260244 Sjt. William Arthur Jowett.

No. 7391855 Pte. Robert William Moore.

No. 7362211 Pte. Josiah Thompson.

Awarded Efficiency Medal (Territorial)

Capt. E. W. Plimmer, M.M. (76211) R.A.M.C.

November 29.

Royal Army Medical Corps.

Capt. R. G. Macfarlane, M.B. (216350) is apptd. to a permanent commission, retaining his present seniority, 29th Nov. 1946.

JOURNAL OF THE ROYAL ARMY MEDICAL CORPS

Corps News.

DECEMBER, 1946.

EXTRACTS FROM THE "LONDON
GAZETTE."

December 12.

Royal Army Medical Corps.

Maj. W. M. E. Anderson, D.S.O., M.D. (63162), resigns his commn., 2nd Aug. 1946.

Specialist.

Short Service Commn.

War Subs. Capt. J. B. Headley-Blythe (230345) from R.A.M.C. (E.C.) is granted a commn. in the rank of Capt., 12th Nov. 1946.

SUPPLEMENTARY RESERVE OF OFFICERS.

Royal Army Medical Corps.

War Subs. Capt. C. S. Pitt (99108) relinquishes his commn. on account of disability, 2nd Dec. 1946, and is granted the hon. rank of Capt.

Awarded M.B.E. (Field).

Awarded M.B.E. for gallant and distinguished service in the Field :—

Capt James Inglis Rice (101002), R.A.M.C.

MENTIONED IN DESPATCHES (Field).

Mentioned in Despatches in recognition of gallant and distinguished service in the Field :—

Royal Army Medical Corps.

Capt. C. D. Sanders (306082).

7262360 Sgt. J. H. Anderson.

7259593 Sgt. F. J. Kelly (posthumous).

2024222 Cpl. J. L. Hasler.

7260898 Pte. J. H. Harvey.

7342997 Pte. E. W. Northey.

7374332 Pte. W. Tolson.

EFFICIENCY DECORATION CONFERRED BY HIS MAJESTY THE KING.

The King has been graciously pleased to confer the "Efficiency Decoration" upon the following officers of the Territorial Army :—

Royal Army Medical Corps.

Maj. (Hon. Lt.-Col.) R. J. C. Hamilton (63303).

Maj. (Hon. Lt.-Col.) H. B. Lee (63105).

Maj. K. W. N. Palmer (50353).

December 6.

Royal Army Medical Corps.

The undermentioned Majors to be Lt.-Cols.:—
Nov. 3, 1946 :—

War Subs. Lt.-Col. J. T. Robinson, O.B.E., M.D. (47427).

Nov. 26, 1946 :—

M. A. Rea, O.B.E., M.B. (47424).

December 10.

Royal Army Medical Corps.

Maj. W. R. M. Drew, O.B.E., M.D., M.R.C.P. (52405), is seconded under the Foreign Office, 16th Sept. 1946.

Specialist.

Short Service Commn.

War Subs. Capt. S. A. H. Lesser, M.B. (199423), from R.A.M.C. (E.C.), is granted a commn. in the rank of Capt., 20th Nov. 1946.

December 13.

Royal Army Medical Corps.

Maj. J. S. Ruddell (63160) retires and receives a gratuity, 13th Dec. 1946, and is granted the hon. rank of Lt.-Col.

Specialist.

Short Service Commn.

War Subs. Capt. J. K. Sugden (71654) from R.A.M.C. (T.A.) is granted a commn. in the rank of Capt., 22nd Nov. 1946.

Capt. P. E. R. B. Unwin (78708) retires, 12th July 1946, having received a gratuity and is granted the hon. rank of Maj.

December 17.

Royal Army Medical Corps.

Lt. (Qr.-Mr.) (War Subs. Capt. (Qr.-Mr.)) Harry Richard King (99213) from Emerg. Commn. to be Lt. (Qr.-Mr.), 17th Dec. 1946.

Lt. (Qr.-Mr.) H. R. King (99213) to be Capt. (Qr.-Mr.), 17th Dec. 1946.

Lt.-Col. C. A. Whittfield, M.B. (15676) retires on ret. pay, 17th Dec. 1946, and is granted the hon. rank of Col.

December 20.

Regular Army.

Maj.-Gen. R. E. Barnsley, *C.B., M.C., M.B., K.H.S.* (15324) late *R.A.M.C.* retires on ret. pay, 19th Dec. 1946.

Royal Army Medical Corps.

Lt.-Gen. Sir William P. MacArthur, *K.C.B., D.S.O., O.B.E., M.D., D.Sc., F.R.C.P., F.R.C.P.I.*, ret. pay to be Col. Comd., 30th Nov. 1946, vice Lt.-Gen. Sir James Hartigan, *K.C.B., C.M.G., D.S.O., M.B., D.Ch.*, ret. pay, who attained the age limit for the appt. on that date.

Maj. K. G. F. Mackenzie, *M.B., F.R.C.S.* (66482), retires on account of disability, 21st

Dec. 1946, and is granted the hon. rank of Lt.-Col.

Regular Army.

December 24.

Col. L. Dunbar, *O.B.E.* (4861), late *R.A.M.C.*, retires on ret. pay, 22nd Dec. 1946.

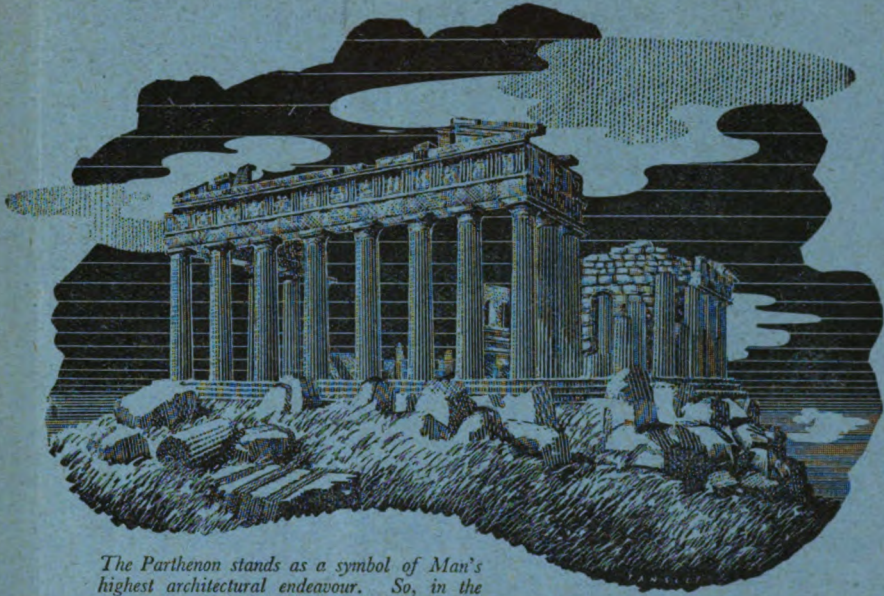
December 31.

Regular Army.

Col. J. S. K. Boyd, *O.B.E., M.B., K.H.P.* (15763), late *R.A.M.C.*, retires on ret. pay, 1st Jan. 1947, and is granted the hon. rank of Brig.

Royal Army Medical Corps.

Maj. W. O. Holst (15623) retires on ret. pay, 1st Feb. 1947.



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